VOLUME XXII FEBRUARY 1929 NUMBER 2

Southern Medical Journal

Journal of the Southern Medical Association

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $4.00. Entered as Second-Class Matter at the Post Office at Birmingham, Ala., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of Oct. 3, 1917, authorized Dec. 20, 1921.

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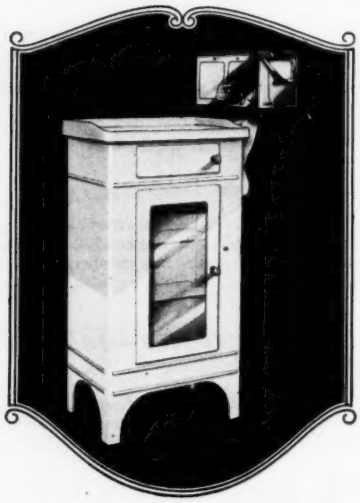

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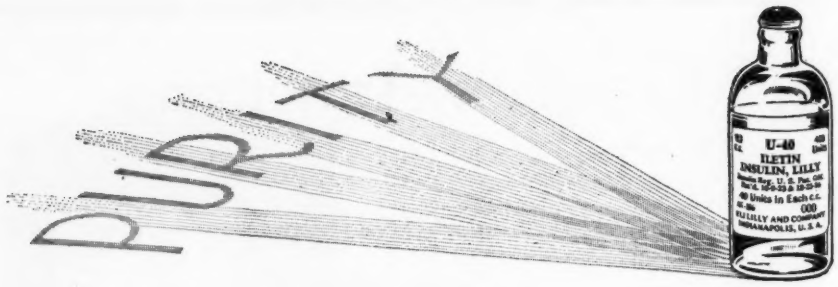

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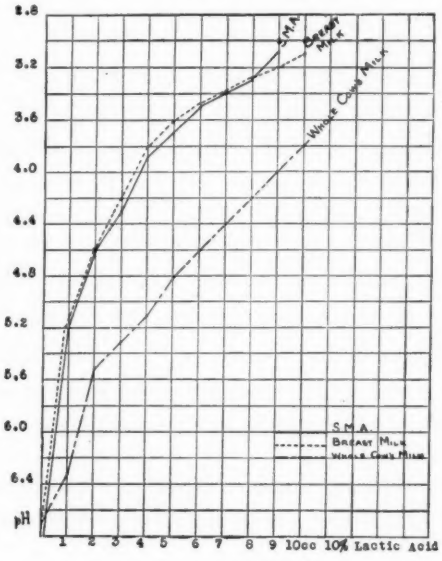
For the same reason that it is not necessary to add an acid to breast milk. (*See Chart*)



This chart shows the buffer curve of breast milk and cow's milk – and the similarity of the buffer curve of S. M. A. and breast milk.

S. M. A. SAMPLES?
WE WILL BE PLEASED TO SEND THEM.

S. M. A. is Produced by permission of the
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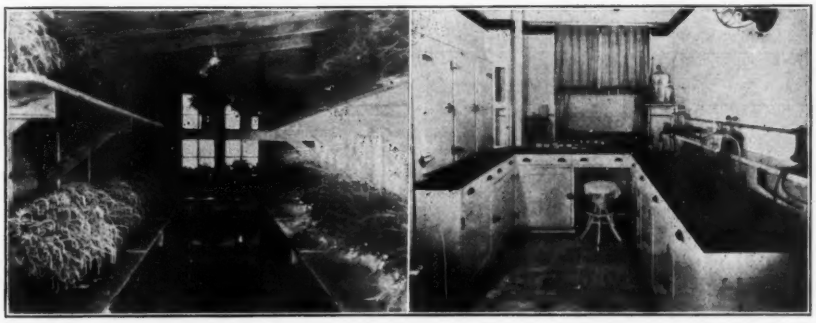

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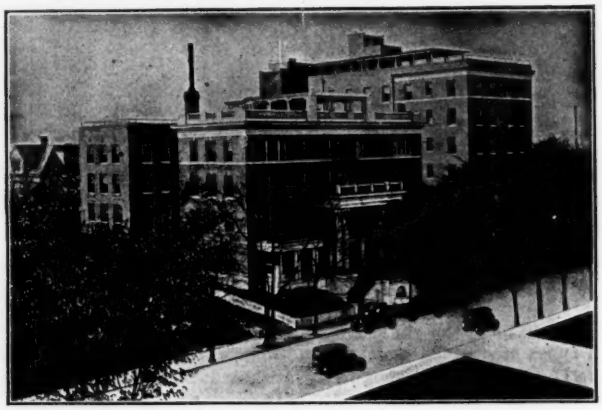

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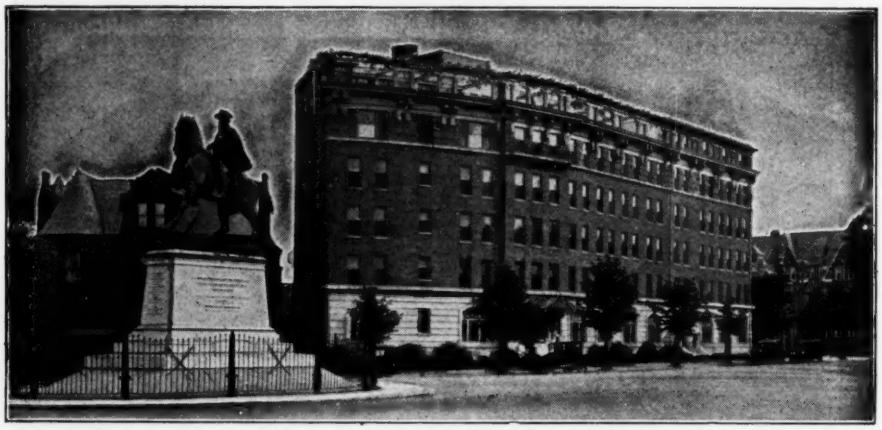

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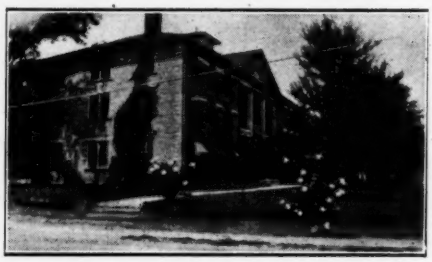

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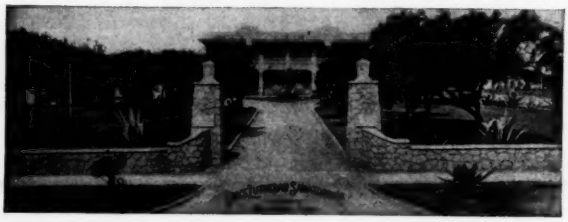

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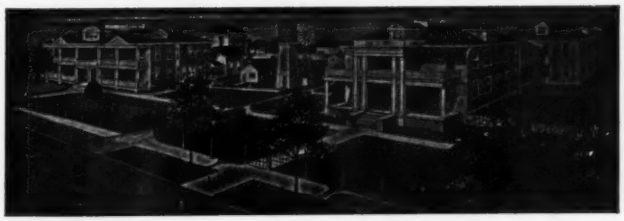

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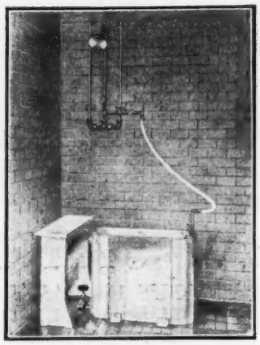

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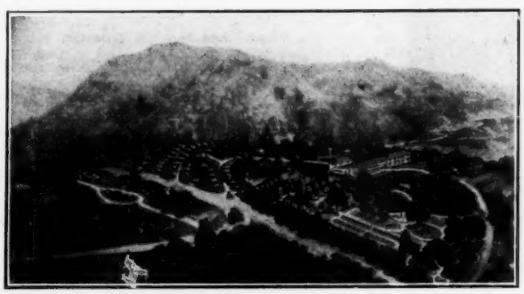

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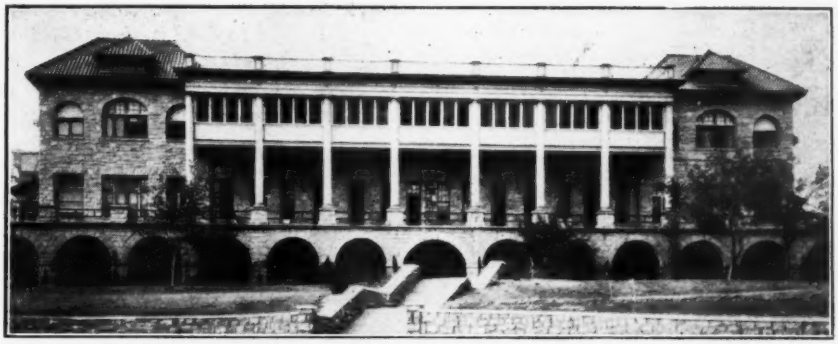

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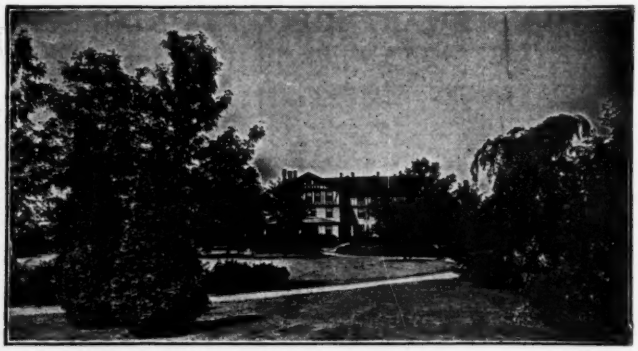

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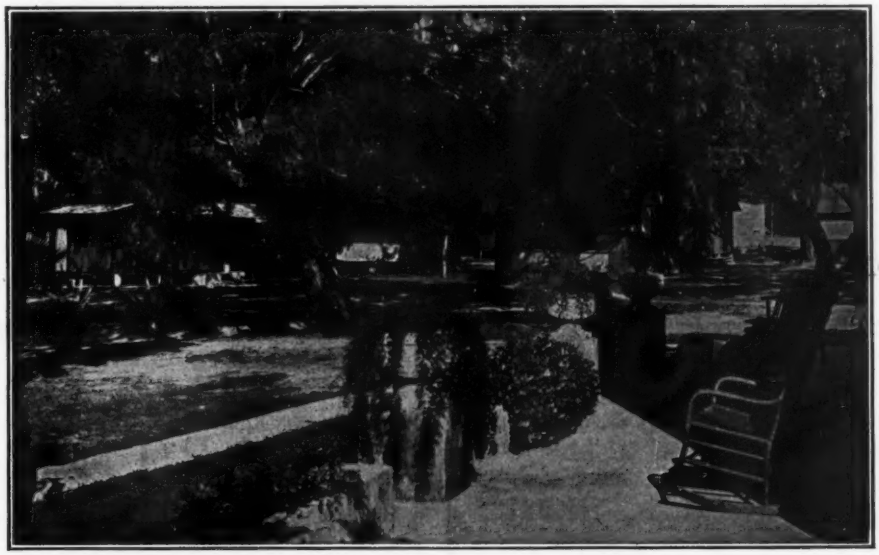

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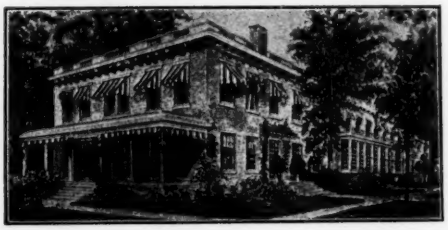

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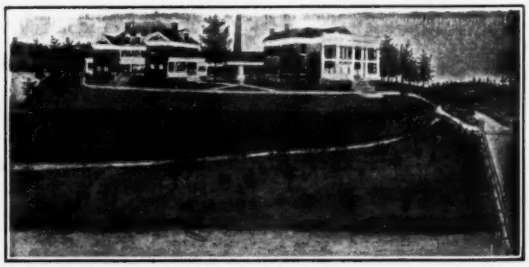

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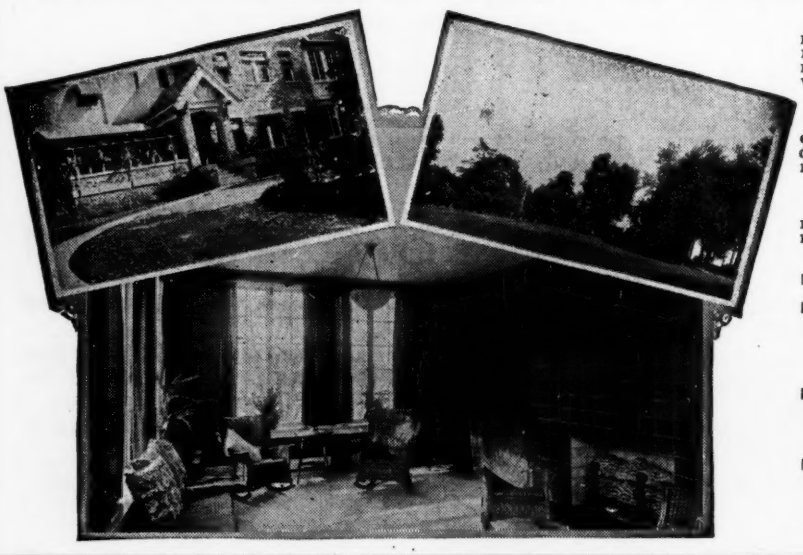

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Volume XXII FEBRUARY 1929 Number 2

CLINICAL ASPECTS OF ENDOMETRIOSIS*

A REVIEW BASED UPON THE STUDY OF 100 CASES

By FLOYD E. KEENE, M.D.,

and

ROBERT A. KIMBROUGH, JR., M.D.,

Philadelphia, Pa.

As a preamble to our remarks, we would pay tribute to Dr. John A. Sampson for his notable work on endometriosis. His ingenious and proven theory of transtubal implantation may be controversial, but this is of minor importance as compared to his contribution to our knowledge of its pathology and life history of the condition; for upon this are based our conceptions of its clinical manifestations and treatment.

The scope of this paper is essentially clinical. Hence we shall give but brief mention to the theories of origin and the pathology will be presented only in so far as it elucidates the clinical course of the disease.

For many years endometrium-like tissue has been recognized as occurring in the ovary, on the surface of the uterus, in the recto-vaginal septum, the umbilicus and elsewhere in the pelvis. In typical instances this issue has a histologic structure identical with that of the uterine mucosa and functionally, its reaction to menstruation, pregnancy and the menopause is similar to that of the uterine mucosa.

Therefore, on the basis of histologic and functional identity, it may be assumed that the misplaced and endometrium-like glands are true endometrial tissue. "Endometriosis" was introduced by Sampson as a comprehensive term to embrace the various manifestations of this lesion.

Several theories have been advanced to explain the presence of endometrium in locations other than the uterine cavity. Von Recklinghausen attributed its presence in uterine myomata to adult remains of the Wolffian body. This theory attracted many adherents and was used by them to explain similar glandular inclusions in the inguinal region (von Recklinghausen), the recto-vaginal septum (Pfannensteil, Schickele) and the labium majus (Aschoff). Von Recklinghausen's Wolffian theory was short-lived, being abandoned shortly after its conception for Cullen's more logical theory of the mucosal origin of glandular inclusions in adenomyomata.

Other observers have attributed ectopic endometrium to embryonic inclusions of Mullerian tissue. Such an origin was suggested by Cullen to explain its presence in a tumor of the round ligament. Russell reported the first case in which endometrium was found in the ovary and favored this theory of origin. The supporters of this theory, particularly as it applies to the ovary, point to the anatomical proximity of the anlagen of the ovary and the Mullerian duct and to the fact that they are both derived from the same parent tissue, the celomic mesothelium. Such a theory is not inconceivable. The Mullerian inclusion theory has also been advanced to explain the presence of aberrant endometrium in the round ligament, the umbilicus and the rectovaginal septum, but the arguments offered in its favor are not convincing.

The theory that tissue simulating endometrium formation may be due to a metaplasia of the peritoneal serosa was first advanced by Ivanoff. To Robert Meyer, however, is due the major credit for demonstrating that epithelial metaplasia can occur in the serosa. It is an accepted fact that the peritoneum, under the influence of inflammation, can alter the character of its endothelial cells so that they become cylindrical or cuboidal. The theory of peritoneal metaplasia is also applicable to the germinal epithelium of the ovary, since both of these tissues have a common origin in the

*Read in Section on Gynecology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

celomic mesothelium. The advocates of this view hold that the cuboidal cells of the germinal epithelium, under the influence of pre-existing inflammation or some unusual endocrin disturbance (Novak), can undergo transformation into cylindrical epithelium which both morphologically and functionally resembles that of the uterine mucosa.

The work of Sampson stands out as one of the greatest contributions to medical literature in recent years. According to his conception, uterine or tubal epithelium may escape during menstruation into the peritoneal cavity through the fallopian tubes. This regurgitated tissue finds lodgment on the ovary or adjacent structures such as the intestine and pelvic peritoneum, particularly the peritoneum of the cul-de-sac. The endometrium thus transplanted has the ability to penetrate the surface on which it lodges and its continued growth and functional activity give rise to adenomata of the endometrial type. Implantations may be limited to the ovaries, may involve the ovary and the pelvic peritoneum, or may be found upon the visceral and parietal peritoneum. The adenomata react to menstruation and thus hematomata may develop from retention of menstrual blood. Such adenomata often remain superficial, or deep invasion of the ovary may occur with the formation of cysts of varying size which contain the typical, chocolate-like fluid. Sooner or later increased tension of the contained blood causes perforation of the cyst wall with dissemination of its contents, including portions of the endometrial lining, to adjacent structures. Thereby, fresh implantations arise which pass through identically the same process. Such secondary implantations are found in the cul-de-sac, the rectovaginal septum, the sigmoid, the appendix, the uterine and tubal serosa and on the parietal peritoneum. Implantation secondary to perforated endometrial cysts of the ovary are more invasive and have a wider distribution than those arising directly by the trans-tubal route.

Sampson has also demonstrated that endometrial cells may metastasize through lymph vessels. On this basis he advanced a metastatic theory for the origin of adenomata of the inguinal canal and possibly the umbilicus. He suggests that endometrial lesions in these areas may also be due to extension by way of the venous channels, but this has not been definitely proven.

The mode of origin of ectopic endometrial lesions is still open to controversy. Transtubal implantation undoubtedly accounts for many instances of peritoneal and ovarian endometriosis. Such an explanation, however, cannot be applied to all endometrium-like formations, for often they are more satisfactorily explained upon a metaplastic or congenital basis.

Pathology.—Ectopic endometrium, wherever situated, is subject to ovarian influence and closely simulates the uterine mucosa in its reaction to menstruation, pregnancy and the menopause. Cullen, in his work on adenomyoma of the uterus, demonstrated menstrual reaction in mucosal invasions of the myometrium. The menstrual changes which he described in the endometrial glands of adenomyomata were identical with those of the mucosa lining the uterine cavity. Pick called attention to the formation of hematomata of the ovary by menstrual reaction of endometrial tissue in that organ, and suggested the possible identity of these hematomata with similar lesions described by Rokitansky.

The periodic swelling and the discharge of blood from adenomyomata of the umbilicus, laparotomy scars, inguinal canal and rectovaginal septum offer additional evidence that ectopic endometrium participates in menstruation. Sampson has described numerous instances of menstrual reaction in ovarian and peritoneal lesions.

Participation in the characteristic endometrial changes of pregnancy is evidenced by decidual reaction of the stroma underlying ectopic endometrium. Decidual changes have been described in adenomyoma of the uterus (Cullen), the ovary (Winestine, Sampson), the rectovaginal septum (Griffith, White, Lochrane) and the umbilicus (Schiffmann and Seyfert).

The effect of the menopause on ectopic endometrium is evidenced by atrophy of the glandular structure occurring after cessation of ovarian function. In the ovary the lining membrane becomes atrophic or at times completely disappears and Sampson states that in such cases there is no histologic evidence of recent menstruation. Decrease in size and often complete disappearance of ectopic endometrial formation after cessation of ovarian function have been noted by many authors; in the sigmoid and rectovaginal septum (Graves, Miles, Donald, King), round ligament (Shaw), and bladder

(Keene and Norris). This regression after the menopause not only offers strong evidence of its true endometrial nature, but is of paramount importance in its bearing upon the treatment of the condition.

Microscopic Pathology.—While the gross pathologic manifestations of endometriosis differ greatly in various locations, the microscopic picture in typical instances is fairly uniform. Scattered throughout the tumor or occurring singly are gland spaces, some of which are microscopic in size, while others may reach a diameter of several centimeters. The glands may be empty or they may be filled with dark blood and cellular detritis. The character of the content depends upon the period of the menstrual cycle at which the specimen is removed.

The glands are lined by a single layer of low cuboidal or cylindrical epithelium with darkly staining, centrally placed nuclei. In many instances the presence of cilia can be demonstrated. The stroma, in typical sections, is composed of loosely packed round cells and fibrous tissue, its structure bearing a close resemblance to the stroma of the uterine mucosa. Throughout the stroma non-striated muscle fibers are found, their number varying in different sections. In less typical sections the stroma may be almost entirely absent so that the epithelium rests directly on the underlying muscle or fibrous tissue. The epithelium overlying such areas is often of the low cuboidal type in marked contrast with the columnar type which is seen where the stroma is well formed.

If the specimen has been removed near or during a menstrual period, evidence of recent subepithelial hemorrhage is present, and in some areas the epithelial lining may be lifted from the underlying stroma. The hemorrhage may rupture through the overlying epithelium, often carrying with it fragments of lining membrane. There is no avenue of escape for the menstrual blood and most of it is retained in the cavity and disintegrates.

In the larger adenomata, especially those of the ovary, the epithelium becomes compressed by repetition of the menstrual reaction so that it assumes the low cuboidal type, or it may be entirely lacking, having been cast off at menstruation or having undergone atrophy from pressure of the contained blood. In such cases the wall is made up of hyalinized fibrous tissue which is often pigmented with hemosiderin.

GROSS PATHOLOGY OF OVARIAN AND INTRAPERITONEAL ENDOMETRIOSIS

Endometrial adenomata of the ovary vary in size from small superficial lesions involving the surface of the organ to large cysts which may reach a diameter of several centimeters. The smaller cysts are recognized as minute red or purple bodies on the surface of the ovary, the color depending upon their age or the phase of the menstrual cycle.

The lesions are usually multiple, and in the same specimen various stages of development may be found, suggesting that they are not all of the same age. One or both ovaries may be involved, but as a rule the lesion is bilateral. Perforation of the cyst wall may occur even in very small lesions, in which event the ovary becomes adherent to surrounding structures at the site of perforation.

Larger adenomata usually have their origin deep within the substance of the ovary and may attain a diameter of several centimeters before perforation occurs. In the majority of cases the ovary becomes adherent to the parietal peritoneum, the posterior leaf of the broad ligament, the uterus or the intestines. In freeing the ovary at operation, the site of perforation is usually opened, allowing the escape of the typical chocolate-like content. Peritoneal reaction is evidenced by the formation of dense adhesions so that, in typical cases, the pelvic organs are firmly matted together. In the lines of cleavage between adherent structures, secondary endometrial cysts may be found.

The dense adhesions characteristic of the lesion are due not alone to peritoneal reaction, but also arise from the ability of these transplanted cells actually to invade the structures with which they come in contact. Evidence of such invasion is more commonly found in the uterus, rectum, sigmoid, bladder and rectovaginal septum. Often there is involvement of the above structures with no demonstrable lesion in the ovary, but, according to Sampson, the invasion under these circumstances is never so extensive as that arising in association with a primary ovarian adenoma. While the lesion is not malignant histologically, its ability to invade adjacent organs may give rise to lesions which grossly simulate carcinoma. This is especially true in adenomata of the sigmoid and rectum where the differentiation from malignancy may be difficult, particularly in the absence of ovarian involvement.

Sampson has called attention to the fact that intraperitoneal endometriosis is commonly associated with uterine conditions which could inhibit the free discharge of menstrual blood, such as myomata or retroflexion. Our observations as well as those of others confirm this assertion. It is noteworthy that in the majority of cases the abdominal ostia of the fallopian tubes are open, and, if we accept the transtubal theory of origin, these two factors must play an important role.

ENDOMETRIOSIS OF THE RECTOVAGINAL SEPTUM

Adenomata in the rectovaginal septum or cul-de-sac may be coincident with peritoneal and ovarian endometriosis, or they may exist as a primary lesion. In the early stages, the tumor is recognized as a discrete, fixed nodule in the cul-de-sac or rectovaginal septum. In the majority of cases, however, a diffuse thickening is present involving both the cervix and the rectum.

The endometrial tissue shows a marked tendency to penetrate the posterior vaginal vault, giving rise to red or bluish indurated cysts which may rupture and discharge dark blood at the menstrual period. On the other hand, the rectal mucosa is rarely, if ever, involved in the process. This lack of involvement of the rectal mucosa and the absence of irregular rectal bleeding are important points in the differential diagnosis from carcinoma of the rectum.

Similar endometrial tumors have been described as occurring in the inguinal region, the umbilicus and laparotomy scars. Our series includes two cases of endometrium of the umbilicus. Both patients complained of pain, tenderness, swelling and occasional discharge of dark blood from the umbilicus at the time of menstruation. On histologic examination typical islands of endometrium were found surrounded by a stroma similar to that of the uterine mucosa. In one of these cases there was an extensive ovarian and peritoneal endometriosis. It is interesting to note, however, that there was no direct connection demonstrable between the intra-abdominal and the umbilical adenomata.

Symptomatology.—From a review of the literature it would seem that the chief interest in endometriosis has centered in its mode of origin at the expense of its clinical manifestation and treatment. One finds frequent reference to isolated cases portraying certain types of lesions, but in only a few instances are analytical group studies available which contribute to the subject as a whole. Since the appearance of Sampson's work in 1921, we have been able to find only two such reports, those of King and Donald, who give conclusions based upon a study of 122 and 108 cases, respectively. Reference will be made to their studies for comparison with our series of 100 cases which have been carefully analyzed from the standpoint of both symptoms and treatment.

Because of the great variations in pathological findings which the lesions of endometriosis present, a discussion of the symptoms necessitates a division into three groups: (1) intraperitoneal endometriosis, which is the most common manifestation, including lesions of the ovaries, tubes, uterus, pelvic peritoneum and intestines; (2) adenomata of the rectovaginal septum; and (3) transplants or fistulae located in the umbilicus or laparotomy scars.

Peritoneal Endometriosis.—The symptoms are by no means uniform as would be expected from the wide variations in its pathologic manifestations as well as the presence of complicating disease frequently found in association with it. Small implants upon the ovary, uterus, intestines or the peritoneum of the cul-de-sac are often symptomless, but with the development of large ovarian hematomata which are invariably densely adherent, or with invasion of neighboring structures, a clinical picture is presented which often permits a definite diagnosis.

Excluding the cases of symptomless implants discovered at the time of operation for some other condition, 92 cases of ovarian hematomata have been subjected to operation and one patient is under observation.

The presence of complicating disease is a striking feature of this series. Uterine myomata were found in 48 per cent, a chronic salpingitis in 13 per cent, and adherent retroflexion in 11 per cent. King reports myomata in 22 per per cent, adherent retroversion in 21 per cent and evidence of a previous inflammation in 39.7 per cent.

Age Incidence.—With but rare exceptions, the lesion manifests itself during the years of active menstrual function. Our youngest patient was 22 and the oldest 53. Only one patient had passed the menopause. The incidence by decades is as follows: third, 22 per cent; fourth, 49

per cent; fifth, 23 per cent; and sixth, 6 per cent.

Sterility.—The extensive alterations resulting from the lesion itself as well as the complicating abnormalities render sterility a prominent symptom. Seventy per cent of our patients were married with a sterility incidence of 42.8 per cent. Of those patients who had borne children, the average interval elapsing since the birth of the last child was 10.1 years. In Donald's series, 40 per cent were sterile and only one patient had given birth to more than four children.

Menstrual Anomalies.—The analysis of our cases leads us to believe that ovarian adenomata *per se* produce no uniform alterations in menstruation.

A summary of our findings is as follows:

	Per Cent
No disturbance	44
Menorrhagia	41
Metrorrhagia	8
Scanty flow	3
Amenorrhea	2
Post-menopause amenorrhea	1

The menorrhagia group comprised 41 patients and in 26 of these uterine myomata were present, so that in only 15 might the symptoms be ascribed to an ovarian dysfunction. It seems justifiable to conclude, therefore, that profuse menstruation is usually a symptom of the complicating lesion rather than of the ovarian adenoma itself.

Dysmenorrhea.—This symptom is commonly present, although we find that in 40 per cent of our patients there was no history of menstrual pain. Dysmenorrhea dating from puberty with no increase in severity nor alteration in type was noted in 13 per cent; 46 per cent gave the history of an acquired or increasing dysmenorrhea, the pain being premenstrual in type and persisting through the first day or two of the flow. With invasion of the bladder, rectum or rectovaginal septum, pain and disturbed function were experienced or became greatly exaggerated at the menstrual periods. In 45 per cent there was intermenstrual discomfort or actual pain in the lower abdomen or pelvis and lumbo-sacral backache was a frequent complaint.

King also states that sterility is of common occurrence, but gives no data in support of this conclusion. In only 25 per cent of his patients were extra-uterine adenomata the only lesion to which a menorrhagia might be ascribed, while in 52 per cent he found complicating lesions within the uterus. Dysmenorrhea was absent in 25 per cent, very severe in over 50 per cent, and the frequency of an acquired dysmenorrhea was a striking feature. Of the patients who complained of rectal pain during menstruation, an adenoma of the rectovaginal septum was present in 75 per cent. Abdominal pain was a symptom in 63 per cent and almost without exception exaggeration occurred at the time of menstruation. Of the patients who were definitely questioned regarding dyspareunia, 8 per cent gave this as a complaint, but King believes its incidence is much greater.

Donald corroborates these findings. Sterility was a symptom in 40 per cent of his patients. Menorrhagia was noted in 57 per cent and in an earlier report this was ascribed to an associated uterine lesion. Dysmenorrhea was a symptom in 70 per cent, being of the acquired type in 50 per cent. There was an incidence of dyspareunia in 57 per cent of the 40 cases investigated with this symptom in mind.

Diagnosis.—The subjective symptoms of intraperitoneal endometriosis show wide variations in degree as well as kind. They are dependent upon several factors, chief among which are the extent of the lesion, particularly invasion of adjacent structures, and the nature of the complicating pathology. Exaggeration of pain or its occurrence only at the time of or shortly before menstruation is characteristic, but this sequence of events may be absent in a large percentage of cases. The clinical picture as a whole rather than isolated symptoms points to the correct diagnosis. Such a symptom-complex may be summarized as follows:

(1) Age, between 25 and the menopause.
(2) Sterility, absolute or relative.
(3) Abnormal menstruation, usually menorrhagia.
(4) Dysmenorrhea of the acquired type.
(5) Dyspareunia.
(6) Sacral backache.
(7) Intermenstrual lower abdominal pain with increased discomfort at the time of menstruation.
(8) Pain in the rectum or bladder which bears a distinct relationship to menstruation.

The objective findings likewise vary with the extent and nature of the lesion, but in the presence of ovarian adenomata, well-developed peritoneal implants, or, more commonly, a combination of the two, the findings are fairly uniform and characteristic. On one or both sides

of and blending into the partially fixed uterus, one finds a slightly tender, densely adherent, semi-solid or firm adnexal mass. Commonly the uterus is in adherent retroflexion or contains one or more myomata. Typical of the lesion are nodulations in the cul-de-sac which are more readily detected by rectal palpation. In our experience, the rectal mucosa overlying the nodulations has invariably been normal in appearance and never adherent to them, an important diagnostic point in differentiating the lesion from a malignant growth. Peritoneal implants in the cul-de-sac without gross ovarian lesions give evidence ot their presence by either an indefinite sense of thickening, resistance or nodulation combined with the uterine findings above mentioned.

Symptoms referable to the bladder or rectum should be investigated by appropriate methods of examination. The proctoscopic demonstration of a normal rectal mucosa is of diagnostic value. In two of our patients, cystoscopic examination revealed the nature of the pelvic lesion. At the base of the bladder, small vesicles were seen in the center of an intensely red and thickened area of mucosa. A few of these vesicles presented a distinctly blue discoloration simulating miniature blue-dome cysts of the breast.

Invasion of the rectovaginal septum may exist as an independent lesion, but more commonly it is found in association with similar intraperitoneal involvement, particularly ovarian adenomata. The small, isolated growths may run a symptomless course, but with increase in size and extent of invasion, they encroach upon the rectum and give rise to pain which is coincident with menstruation, with relief during the intermenstrual period. In the six cases which have come under our observation, these adenomata have never produced bleeding from the vagina or rectum, but this may occur and, as with pain, coincides with the menstrual epoch. The involvement may be so extensive as to partially or completely occlude the rectum or the terminal segment of the ureter, giving rise to symptoms indicative of this obstruction. In none of our cases, however, has such severe symptoms been produced.

To one familiar with the condition, it is readily recognized, but in the presence of extensive invasion with nodular infiltration it may be mistaken for a malignant growth of the vagina or rectum. Important distinguishing points in favor of endometrial adenomata are absence of ulceration, a normal rectal mucosa which, with rare exception, is not adherent to the nodulations and rectal pain or bleeding occurring only at the time of menstruation.

Primary adenomata of the umbilicus, implantation growths in laparotomy scars and adenomata in the groin present similar clinical pictures, the characteristic symptoms common to all being pain and swelling during the menstrual periods. More rarely there is a periodic discharge of blood from these nodules which is coincident with menstruation. The implantation adenomata are usually attached to the fascia, therefore, during the earlier stages of development they are deeply placed and are recognized as tender, somewhat fixed masses along the laparotomy scar which, on palpation, closely simulate an incarcerated omental hernia. The more superficial growths or those primarily of umbilical origin may present a bluish discoloration and give the appearance of a chronic inflammatory thickening.

The periodic discharge of blood from the umbilicus of a patient who has had no previous operation is pathognomonic of an adenoma of the endometrial type. As a post-operative manifestation, on the other hand, such a deduction is not warranted, particularly, in the presence of a sinus unassociated with definite nodulation. A true fistula may exist, the tract leading to some structure in the pelvis such as the uterus, ovary or tube which is the source of the bleeding. From the standpoint of appropriate surgical treatment, the differentiation between the bleeding of a superficially placed adenoma and that of an intraperitoneal organ is of paramount importance. To illustrate this point, we cite three cases which have come under our observation and a fourth reported by our colleague (Goldsmith), in all of whom a bleeding fistula developed in a laparotomy scar.

(1) Cesarean section. Discharge of blood at the time of menstruation continued for several months until the passage of a silk ligature, when the fistula rapidly closed.

(2) Cesarean section. The fistula had its internal opening in the uterine cavity.

(3) Primary operation not known. The fistula communicated with the outer end of the right fallopian tube.

(4) Goldsmith's case. The fistula took its origin from an endometrial hematoma of the right ovary.

As an aid in demonstrating the depth and possibly the internal opening of the tract, we would suggest a roentgenogram of the fistula injected with lipiodol or a uterogram. At the time of operation we have found the injection of an aqueous methylene blue solution a valuable aid in visualizing the course and origin of the fistulous tract.

Treatment.—Ovarian function is essential to the activity and proliferation of all lesions included under endometriosis. Conversely, cessation of activity and progressive atrophy follow ablation of this function. Exceptions to this sequence of events are rarely encountered; hence the principles of treatment must be based primarily upon these established facts, whether this be in the form of surgical intervention or irradiation. Being essentially a disease of comparatively young women in whom ovarian conservation is desirable, it is self-evident that the decision as to the proper treatment may present a perplexing problem.

Only too often radical measures must be adopted, but we are convinced from our experience that, whenever possible, it is wiser to err on the side of conservatism. We believe the following results of conservative measures warrant this conclusion. In 32 patients, one or both ovaries were conserved and only two have had subsequent pelvic disease; one developed a retention cyst of the conserved ovary a year later, and in the other, an implant was discovered in the vaginal vault six months after operation. Of 21 patients in whom the menstrual function was preserved, only one has had any irregularity and this amounted to only an occasional intermenstrual spotting. Of 14 married women in whom the child-bearing function was preserved, and who were operated upon a year or more ago, normal pregnancy has occurred in 28 per cent.

Into the group which are amenable to conservative measures fall the smaller ovarian adenomata which can be readily excised and the minute ovarian implants which are easily destroyed by cauterization. The peritoneal implants are small, symptomless and increase slowly in size. Hence no treatment is necessary.

Unfortunately, more radical procedures are required in many cases. Large ovarian adenomata are invariably densely adherent so that their liberation is attended by such injury to the ovary, uterus, or both, that excision of the affected organ is imperative. The ovaries may present only minor lesions or more rarely be normal, yet an extensive adenomatous invasion of the rectum, sigmoid or bladder has produced decided impairment of function. Here, again, nothing short of a bilateral oophorectomy will suffice. In the presence of such invasion excision of the diseased area is rarely necessary. Incident to cessation of ovarian function, a gradual regression occurs; this is a slow process, which often requires months for its completion. Advantage should be taken of this atrophic process in the treatment of intestinal obstruction secondary to adenomatous invasion. If the obstruction is complete, it is wise to combine temporary colostomy with bilateral oophorectomy. Should the patient's condition be such that the combined operation is hazardous, the obstruction should be relieved by a colostomy with subsequent oophorectomy or irradiation, depending upon the extent and nature of the pelvic condition.

Four patients in our series presented symptoms of chronic, partial intestinal obstruction due to adenomatous invasion of the rectum or sigmoid. In one, the lesion was mistaken for a carcinoma and resection was performed, while in three complete relief of symptoms followed upon a bilateral oophorectomy. A similar result after ovarian excision was obtained in a case of bladder invasion, while in a second case of bladder involvement the adenomata regressed, but a carcinoma developed subsequently. It is noteworthy that the carcinoma originated from the bladder mucosa and not from the adenomatous nodules (Heaney).

Graves calls attention to the fact that regression does not invariably follow upon cessation of ovarian function and cites a case reported by Cullen in support of this statement. He assumes that

> "these adenomata may possess different degrees of clinical malignancy and some have passed the bounds of ovarian influence so that when the ovarian hormone is removed, they continue to grow independently."

Certain it is, however, that such independent growth is of rare occurrence.

We believe that surgery is the procedure of choice in the treatment of these intraperitoneal lesions and that irradiation, whether by radium or the x-ray, should be resorted to only in rare instances. Large ovarian adenomata with their grumous content, dense adhesions and the uterine disease which is commonly present, certainly

belong in the surgical domain. Conservation of ovarian and uterine function should be the aim whenever feasible and this can be accomplished often by surgery and never by irradiation, since a menopausal dose is required if regression is to follow.

Isolated nodules in the recto-vaginal septum or an easily accessible area of multiple nodulations may be excised. When the septal invasion is more extensive and is associated with gross ovarian or uterine lesions, or both, we prefer a bilateral oophorectomy and hysterectomy, feeling assured that we can anticipate with certainty a gradual regression of the septal lesion. Often the nodules are situated just behind the cervix, which is fixed in a high position, making excision a difficult as well as hazardous procedure. Unless symptoms directly referable to the lesion are present, we see no indication for excision or any other form of treatment, merely keeping the patient under observation. At present three such cases are under our care, and to date there has been no indication for treatment. Should doubt exist as to the exact nature of the growth, biopsy is indicated.

We believe that rectovaginal adenomata which are not associated with demonstrable ovarian lesions and which are producing severe rectal pain, bleeding or partial occlusion, can be successfully treated by radium or the x-ray, but the desired results require a menopausal dose. We have used x-ray irradiation in three patients with relief of pain and gradual atrophy of the growth in each case. Under such circumstances, irradiation is employed for its effects upon ovarian function and not with the idea of directly affecting the adenomatous growth. We have had no experience with direct radium implantation, but the treatment does not seem logical and the production of a rectovaginal fistula is certainly not a remote possibility.

Wide excision is the only treatment applicable to primary adenomata of the umbilicus as well as secondary transplants in the groin and laparotomy scars. A post-operative sinus which discharges blood at the time of menstruation should be carefully investigated to determine whether it is superficial sinus or a true fistula leading to an intraperitoneal organ. In the latter case, complete excision of the fistulous tract and appropriate surgical treatment of the involved organ are essential to cure.

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CHRONIC ETHMOIDITIS: ITS CONSERVATIVE SURGICAL TREATMENT*

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When one offers a treatise before a gathering of this sort, it is more or less understood and expected that his presentation is rather in the form of a compilation taken from every available authority and in the end it leaves the listener to draw his own conclusions as to the relative efficacy of the various methods described. Now I propose to deviate from this custom and present the subject entirely from our own point

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

of view: in other words, give it as we see and understand it with the treatment that we have found most suitable for that particular case or condition.

Chronic infections of the ethmoid, as is now well understood, can broadly be divided into the suppurative and non-suppurative. In the first instance an infection is present characterized by the formation and exudation of a purulent secretion accompanied by the appearance in the ethmoid region of a more or less widespread catarrhal inflammation. The purulent secretion varies from time to time in its consistency, at one time being thin, acrid and almost watery, and again assuming the characteristics of a thick, yellow discharge, the same which the older surgeons were wont to term laudable pus. In the ordinary case, variations between these extremes were the rule rather than the exception depending upon, as the patient would say, the acquisition of a fresh cold, which usually was not the case, but in reality represented more an acute exacerbation of his chronic condition. This would naturally account for the changes in the consistency of the secretion which was sometimes thick and profuse, sometimes thin and scanty, ofttimes making one erroneously believe that a cure was in progress. As the infection spread, the discharge, particularly that collecting during the night, became more constant finally resulting in that condition of chronic purulent ethmoiditis which is well known to all of us.

The other form of ethmoiditis, the non-suppurative type, is a much later development. It was recognized in a way by some of the early pioneers as for example Woakes and Bosworth, but it was not until after Uffenorde published his treatise that it obtained universal acceptance. The type I refer to is that form characterized by polypoid hypertrophies and even true polyp formation unaccompanied by true leucocytic pus. Hitherto, Zuckerkandle's postulate that the polyps were the products of the purulent secretion, had been accepted without question. Even after the publications of the microscopic pathology both in Germany and the United States, much doubt was expressed as to the proper interpretations of these findings and many months, I might add years, elapsed before this doctrine was accepted at even its face value. I think we all now recognize hyperplastic ethmoiditis as a separate and distinct pathologic entity in contra-distinction to the earlier known suppurative infection. The fact that these two can and do occur as separate forms does not preclude the possibility of their being combined and occurring as hyperplastic infection with suppuration. As a matter of fact, the probability of the suppuration is directly proportional to the extent of the hyperplasia. The greater the polyposis the more likely that the commoner forms of saphrophytic micro-organisms will find a suitable media for their growth with the formation of their suppurative products. When these once gain a foothold I have never seen them disappear.

As the ethmoid labyrinth is not only divided into two portions (the anterior and posterior) by a complete partition, but these also are subdivided into numerous chambers (cells), and as these may be individually affected it would be well before taking up the treatment to make a more comprehensive classification. Following this, the indications for surgery with especial reference to certain methods will be greatly clarified.

Suppurative:

(a) One or more of the anterior cells.
(b) One or more of the posterior cells.
(c) Combined, affecting both anterior and posterior cells.

Hyperplastic:

(a) Localized hyperplasia (small polyps).
(b) Anterior labyrinth.
(c) Posterior labyrinth.
(d) Intra-cellular.
(e) Extra-cellular.
(f) Combined.

The last three, d, e and f, may represent merely an extention of the inflammatory process and can occur equally in any part of the labyrinth.

(g) Suppurative infection.

This represents the final stage when either a new infection occurs or the old one has advanced so far and the tissues have become so infiltrated as to invite leucocytic diapedesis with the formation of a purulent secretion.

Let us now consider individually these different forms.

(a) *Suppuration in One or More of the Anterior Cells.*—This intranasal type as far as I am concerned, as an individual entity, with one exception, is non-existent. Of course, when an orbital ethmoid cell situated behind or external to the frontal sinus and outside the nose is present, it may easily become infected and simulate a frontal sinusitis; but as we are concerned only with that portion situated within the nasal cavities this lies beyond the scope of our pre-

sentation. The remaining anterior cells (with the exception noted above which I will come to later), are those known as the infundibular which includes the frontal bulla, when present, and that one lying within the agger of the nose. I do not recollect ever observing a circumscribed chronic purulent infection of the mucosa of these cells unaccompanied by infection of the frontal sinus. Presumably this is possible but since it has never come under my own observation nor that of my colleagues, its occurrence is, as far as I am concerned, only of academic interest.

The exception referred to was a purulent infection of the lining membrane of the bulla ethmoidalis. Formerly, an abscessed bulla was considered an event of no uncommon occurrence, but this was probably due to the fact that when it was present it so overshadowed other infection as to cause the latter to be entirely overlooked. I am sure if you review in your minds the cases occurring in your practices you will bear me out in this statement. However, other things being equal, the evacuation of a badly diseased bulla will bring about a cure, despite the fact that the infection has embraced other cells in the immediate neighborhood.

(b) *Purulent Infection of the Posterior Cells.*—That these cells are more frequently the seat of chronic disease is due to a number of conditions. In the first place they are larger and more numerous. Secondly, they are so situated as to be less amenable to aeration due to the presence of the middle turbinate. Their drainage can easily be interfered with by slight swellings of the nasal mucosa, and lastly, their anatomical situation prevents easy access to exact diagnostic instrumentation, even with the aid of the naso-pharyngoscope. Being but slightly disturbed by the inspiratory air currents they offer a fine media for micro-organismal growth once infection has taken place. This extension may be so gradual and insidious that the patient is unaware of the seriousness of the condition until a well marked infection has occurred; he having, it is true, noted the unwonted postnasal discharge and stuffiness in the nose, particularly on arising, but as the inconvenience was not great, putting the whole matter down as a particularly tenacious cold. This, however, is noted more in the hyperplastic variety than in the suppurative.

(c) The combined form affecting both the anterior and the posterior cells is always more frank in its course, as it usually represents (in contradistinction to the other types) the direct sequelae of an acute infection or perhaps a series of acute inflammatory disturbances. In the event of such a widespread infection, the symptoms are so apparent as to obviate further elaboration.

The Hyperplastic Types.—This, of course, is a pathologic condition. A portion of the ethmoidal mucosa undergoes hyperplastic changes which range from slight degeneration in a small portion of the lower border of the middle turbinate to the formation of the actual sessile polyps the size of a small oyster. While the lower edge of the middle turbinate appears to be most frequently affected, nevertheless the actual polyps, when present, appear to take their origin higher, having their bases in the body of the ethmoid or along the uncinate process. I do not recall ever having observed large single polyps originating along the lower edge of the middle turbinate. The anterior labyrinth is usually the seat of the large extra-cellular hypertrophies which lie more or less loosely in the nasal cavities, while in the posterior labyrinth the intracellular variety hidden from view is the rule. This is probably due to the fact that there is more room for growth anteriorly beneath the turbinate than posteriorly between the body of the ethmoid and the nasal septum. The large so-called choanal polyps do not, as a rule, originate in the posterior cells, but if traced to their source will be found to spring from the mucosa of the maxillary sinus, forcing their way out through the *pars membranacea* and extending into the naso-pharynx through the medium of a long pedicle. Of course in either labyrinth the primary affection, whether it be intra or extracellular, may become combined, which represents in either case only an extension of the pathologic process from within outward or without inward as the case may be. This is well illustrated in those old chronic cases where the entire ethmoid from the uncinate process to the anterior sphenoidal wall is one mass of polypoid degeneration. All of us have seen such cases which continued for years accompanied by a profuse watery secretion which would dry on the handkerchief, causing a stiffness, but not staining the linen. When infection by the *Staphylococcus aureus* occurs the secretion becomes thick and yellow with the characteristics of true pus, but this seems to appear in cycles, particularly on the acquisition of every fresh cold. The true

combined form becomes permanent only when the micro-organisms find lodgment deep in the mucosa. Even then the suppuration appears to be different from that caused primarily by the influenza bacillus; for in the first instance the secretion seems to be more profuse and is easily discharged, the nasal passages are comparatively clear, while in the latter the pus is thicker, more tenacious and exhibits a great tendency to form into crusts.

Permit me now to digress for a moment to give you the various forms of treatment used by us and later to apply them to their appropriate pathologic condition.

TREATMENT

The successful treatment of all sinus infection, particularly where the ethmoid is concerned, has for its basic principals aeration and drainage with emphasis upon the former. We have long since felt that the old dictum of removing all infected ethmoid tissue, irrespective of the kind and extent of the inflammatory process, was as unnecessary as it was radical. With proper assistance, Nature will do much to bring about a resolution of the mucosa in diseased cells after proper aeration has been established. This tendency of Nature is of no little import when we call to mind some of our earlier ethmoid cases which were in the beginning perhaps mild, but, after our well-meaning surgical intervention, were transformed into a disorganized suppurating mass with landmarks obliterated and with, instead of relief, augmented subjective discomforts. Observing these results, not only in my own practice but in that of my colleagues, I was prompted to seek the solution and found that over-enthusiasm was the cause of my undoing. Instead of sending a boy to do a man's work, I went to the other extreme and sent a man to do a boy's. In other words, I was prone to overdo the removal of ethmoid tissue rather than conserve it, thinking that to leave even the slightest amount of diseased mucosa behind would result only in a nidus from which the infection would gradually spread until the condition became as bad or even worse than before the operation.

In those days drainage was our deity, the *sine qua non* of a successful treatment. Ventilation, it is true, was looked upon as a desirable but not necessarily an indispensable adjunct. A suppurating cell should not only be opened, but completely eradicated, encroaching upon healthy neighboring tissue if necessary in order to bring about our purpose. Now, thanks to our experiences with the sphenoid in which we saw hyperplastic tissue almost filling the cavity shrink down in a few days under our very eyes until in a short time it was again normal, all this has changed. We know and confidently expect that Nature, with a little assistance, will do a far better and cleaner job and procure a physiologically functioning area of tissue in the ethmoidal region, while we with our widespread and ofttimes haphazard procedures only leave an area of debris which soon becomes reinfected and degenerates into a disorganized fibrous suppurating mass.

It is to anticipate this very eventuality that I propose to lay before you for your consideration the various forms of treatment practised by us at the present time. It is not in the form of a recommendation, but rather as a communication that these are presented, not to be taken as dogmatic in any sense, but rather at their face value for what they may be worth.

Let us begin with the mildest of the suppurative types and ascend until we have the severest complicated form to deal with, applying their appropriate treatment as each is met.

Simple Catarrhal Infection.—This is characterized by mild headaches, stuffy nose and a fairly constant thin mucoid discharge, which becomes thick and yellow at times, the patient being apparently very susceptible to attacks of acute coryza. Rhinoscopic examination often shows but little besides a hyperemia and congestion of the mucosa when compared with the opposite side. Pus is conspicuous by its absence, at least as far as the examiner is concerned. However, the patient often states that considerable discharge, particularly post-nasal, is in evidence during the morning hours. This form yields slowly to the old shrinking and cleansing treatment, but shows a great tendency to recurrence. To obviate this, I have found the removal of the swollen and often infected middle turbinate almost a *sine qua non.* The purpose of this is first of all to permit thorough aeration and ventilation to the diseased cells, and secondly to furnish sufficient space to make possible the application of cotton poultices which are saturated with certain medicaments. In given cases where the nasal passages are congenitally narrow and the mucosa of the septum is greatly thickened, I have found it necessary to resect that part of the septum in its entirety, making a huge perforation so that these mem-

branes can no longer swell and compress the membrane of the ethmoid on its respective side.

After the middle turbinate is removed and the roughened edges are smoothed nothing further is done, even though the temptation be severe, and the parts are allowed to heal. After five days have elapsed treatment by means of tampons is instituted. This consists of the application of a cotton tampon saturated with a 10 to 20 per cent solution in half water, half glycerin, of a non-irritating silver preparation which covers the ethmoid from the anterior sphenoidal wall to the uncinate process. This should be allowed to remain *in situ* at least five hours. I use a preparation called silvol, but there are others which to all intents and purposes are identical. These applications deplete the tissues of their inflammatory content by the hygroscopic action of the glycerin, thereby permitting the silver partially to penetrate the cellular interstices and bring into action its germicidal and astringent effects. In order to obtain the maximum effect three things are essential: (1) the solution should be freshly made; (2) the solution should be warm; (3) the tampon should remain in place five or more hours. These treatments are instituted at first every other day, gradually tapering off directly as to the improvement noted. This usually requires but a few weeks, as the affection readily yields to this form of treatment.

Purulent Infection Confined to the Anterior Cells.—As a disease *per se*, this is one of the rarest we are called upon to treat. It is true that occasionally one sees an infected and suppurating bulla ethmoiditis and even an orbital ethmoidal cell which simulates a frontal infection, but by and large when the anterior cells are suppurating we have an infected frontal sinus which is also secreting pus. Under these circumstances a cure of the underlying ethmoid depends upon first ridding the frontal of its infection. Sometimes after this is accomplished the bulla will continue to secrete owing to the ostium's becoming partially occluded from the inflamed and swollen mucosa, thereby seriously interfering with the normal drainage and practically eliminating aeration. When this occurs it will be necessary to open the floor of the bulla and re-install both drainage and aeration. If this is the sole remaining focus of infection, a cure speedily follows.

Suppuration in One or More of the Posterior Cells.—This condition, although not uncommon, is one of the most difficult and one of the most rarely early diagnosed of the sinus infections. The reason for this is apparent when we consider the mild and ofttimes vague symptom-complex together with the almost inaccessible location, even to the naso-pharyngoscope, of these posterior cavities. We can study with a fair degree of exactitude the cells emptying into the superior nasal passage, but those which lie to the outside of these and those lying in the depth of the spheno-ethmoidal fissure are beyond our inspection. Indeed, many of these cases, with a low grade infection in one or more of the cells, have escaped detection for years, having been considered merely a chronic catarrhal condition, until the sudden appearance of a severe ocular disturbance invited immediate attention, which then resulted in the discovery of a latent sinusitis. One clue is always at hand if we are sufficiently astute to take advantage of it, and that is the appearance of the middle turbinate. The body of this structure appears slightly hypertrophied and ofttimes has a mottled appearance. While to the casual observer this may escape notice, yet if one carefully compares the turbinate with its fellow on the opposite side, the difference will at once be apparent.

The logical treatment is, of course, to secure better aeration and drainage which can be accomplished only by the total removal of the middle turbinate. This resection not only aids materially in contributing to these therapeutic advantages, but incidentally brings under our view those cells which subsequently may require opening. Unless the suppurating areas have accurately been disclosed or unless symptoms are pressing, it is well to wait for a few days in order definitely to determine the exact seat of the infection before attacking these cells. The silver poultices will be of great advantage in this determination, for I have often seen an apparent general suppuration under this treatment localize itself into one or two defined regions which lent themselves admirably to instrumentation. Formerly it was our practice completely to excavate all these posterior cells when infection was discovered in their midst, but now we open with the hook and with the Grunwald forceps remove only the diseased portion until healthy tissue is reached. In this way we have not only procured quite as good end-results as far as a cure was concerned, but conserved tissue which certainly possesses a normal functioning activity. After these cells have been

opened and exposed to thorough aeration, Nature speedily affects a cure which is in direct relation to the thoroughness of the operation.

Combined Suppuration Affecting the Entire Labyrinth.—This condition is usually an old one where the middle turbinate has long since been sacrificed, but from one cause or another the infection has gradually spread until both the anterior and posterior cells are more or less involved. Nothing but a so-called complete exenteration will be of the slightest permanent avail in these cases. In our experience the crux of this situation lies in the preliminary removal of the uncinate process, for by this step we gain from 1/8 to 3/16 inch room which may prove of inestimable value in reaching the agger and infundibular cells, to say nothing of the depths laterally to the spheno-ethmoidal recess. This can be readily accomplished with a flat chisel without particular danger in careful hands.

After the uncinate has been removed, the posterior lying cells may be methodically attacked and resected, keeping close to the orbital plate until the anterior sphenoidal wall is reached. It is well to leave a certain amount of the inner wall of the ethmoid *in situ,* particularly that portion which houses the terminal filaments of the olfactory nerves. While it has been shown that infection may travel through the cut sheaths of these nerves and enter the meninges, nevertheless I do not fear this so much as I desire the preservation of the sense of smell in this locality. Regarding the occurrence of meningitis following the severance of these nerves, it must be a very infrequent occurrence, otherwise all of us would at one time or another have met with this tragic misfortune. Even though I have had fatalities, I do not believe any of them has been due to this cause. As a matter of fact, I have on several occasions removed diseased bone which exposed the pulsating dura in the immediate vicinity of the olfactory fissure, which in one or two cases was followed by the escape of a quantity of cerebrospinal fluid. Most of these, however, despite my anxiety, recovered without untoward symptoms. Notwithstanding these fortunate outcomes, it is nevertheless better to be safe and shun this dangerous region by conserving the olfactory area with its mucosa, as ventilation and drainage should obtain quite as well as though it had also been removed. Following this procedure I know of no condition that reacts more favorably to the silver tampons as an after-treatment than this one.

Hyperplastic Ethmoiditis, Localized Hyperplasia (Polyps).—The surgery of polyposis and polypoid conditions affecting the ethmoid is of such universal knowledge that I do not propose to abuse your patience by detailing these procedures. I shall, however, touch upon some of the more prominent facts concerned in the permanent ablation of these growths. The localized hyperplasias or separate polyps springing from the naso-frontal region and beneath the anterior end of the middle turbinate are usually removed with the snare. Unless, however, the bony attachment is also resected, they are almost certain to return; therefore, emphasis should be placed on this phase of the operation in order to insure a permanent disappearance of the growths. The preliminary resection of a portion of the middle turbinate depends upon the accessibility of these bases to instrumentation. I have often noted in the presence of these moderately large sessile polyps that the hyperplasia is usually confined to the mucosa outside the cells, it being rare to find co-existing intra-cellular polyps. The one exception to this is the old chronic cases where the entire labyrinth has long since been diseased. While polyposis of the anterior cells is nearly always extra-cellular, with the posterior cells the opposite obtains as one rarely encounters large polyps hanging down into the choana which take their origin from this region. (The large solitary choanal polyp in nearly every instance comes from the maxillary sinus, a fact which I have been able to demonstrate time and time again.) This does not mean that the external mucosa is not also affected, for it, too shows marked change, but it is more in the nature of a polypoid degeneration than of large pedunculated polyps.

When the anterior and posterior labyrinths are co-affected we, therefore, have both an intra-cellular and extra-cellular condition to deal with. As a rule, these combined cases have progressed insidiously over a number of years until the entire ethmoid capsule has become a mass of polypoid degenerating mucosa. This is the type of case which is often associated with asthma and hay fever, or at least its symptom-complex may be attributed to the presence of the polypoid tissue. We have found that the only rational treatment from a curative point of view is the complete removal as far as is humanly possible of the polypoid degenerating tissue.

Several methods lie at our disposal and we always try to select that one which seems to be particularly suited to the individual case. In this way exigencies such as abnormal anatomical configurations are met with and successfully overcome. Ignoring, then, the ordinary procedures adapted to the simpler conditions, we shall consider those commonly used in our Country when complete exenteration of the ethmoid is under consideration. These are the Grunwald, the Hajek, the Mosher, the Sluder and the Ballenger in their various modifications. Most of these methods, in their original concept, have long since become obsolete, so I shall only briefly picture the various steps as now practised, at least in our Clinic.

CONCLUSIONS

A brief retrospect over the intra-nasal methods of operating upon the ethmoid shows us first of all that to accomplish successfully any operation that is worthy of the name an intimate knowledge of the anatomy both relational and surgical is essential. This knowledge, like a two-edged sword, cuts both ways, for it not only gives the operator confidence fearlessly to remove tissue, but also the wisdom to exercise caution when approaching a dangerous area. All of us who have concerned ourselves to any considerable degree with intra-nasal ethmoid surgery must have been convinced that it is impossible in every case completely to expose the mucosa of each and every ethmoid cell. At least this holds true in my own experience. There exists, unfortunately, no anatomical configuration of these cells that one can use as a normal model, so that in operating (despite all the stereoscopic skiagraphs we may have had made) it is the idealistically normal that we must keep in mind, and if in the midst of the exenteration we encounter great variations, they must at once be considered anomalous and we must proceed with the operation accordingly. Small wonder is it, then, that certain deep-lying cells escape our attention, this being the reason why in these cases our ultimate results are not 100 per cent good. Indeed, it is now my custom to try to impart this knowledge to those patients of better understanding before attempting any operation and state that the improvement should be measured by a certain percentage according to the severity and condition of the case, say from 60 to 95, 100 per cent representing, of course, the perfect result. While all of my cases have by no means been restored to their original normal functioning activities, nevertheless I have long since become convinced that, properly executed, the intra-nasal operation on the ethmoid offers the least dangerous, if not most facile, opportunity to the patient for relieving him of his distressing and ofttimes dangerous infection.

INTRANASAL TREATMENT FOR CHRONIC DISEASE OF THE NASAL ACCESSORY SINUSES*

By CALHOUN MCDOUGALL, M.D.,
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Chronic infections have existed in the nasal sinuses since ancient times, but not until the past thirty or forty years has our profession recognized that the abnormal condition seen in the mucous membrane of the nose was the result of pus which drained from the accessory sinuses. Hypertrophic rhinitis, rhinorrhea and post-nasal catarrh were the names given to these chronic infections in the nasal chambers.

The influenza epidemic of 1918 and its frequent recurrence since have greatly increased the number of infections in this locality and afforded the rhinologist of the past decade a wonderful opportunity to treat nasal sinusitis. Also many of us were in large army hospitals where the most daring radical surgery could be done without fear. I think that this was a great factor in creating the wave of radicalism that has existed in our ranks. It looks as if the pendulum were beginning to swing back as heralded by our distinguished guest and my Commanding Officer in the A. E. F., Dr. Ross H. Skillern, in his excellent paper on conservative and surgical treatment of chronic ethmoiditis.

The writer does not think that we should go back to the practice of the nose sprayers and throat swabbers and let patients go blind from optic neuritis and die from intracranial complications resulting from purulent infections in the sinuses. Radical operations are indicated for successful treatment of some of these infections.

We could not do without the operative technic of Killian and Lynch on the frontal sinus, Mosher, Crowe and Shea on the ethmoid and sphenoid, and Caldwell-Luc and Denker on the

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

maxillary sinuses. The nasal sinuses present problems which are characteristic of them alone. They may be inaccessible to surgical procedures through their natural orifices due to anomalous extensions or configuration of the surrounding parts. These sinuses are air chambers so arranged that air may enter each one through its openings. The permeability of these ostia affording aeration and drainage is of first importance in carrying on physiological functions. Harkness[1] says that the nasal accessory sinuses are physiological air chambers whose lining membranes are individualistic in their histology and pathology. The prevalence of changes in the lining membranes that may be termed pathological is very great in an individual who is enjoying good health. If possible, every case of chronic sinusitis should be carefully observed two or three months before any operation is performed. The economic condition of the patient, his environment, climate and residence should be considered carefully. The treatment is to establish aeration and drainage to these sinuses so that the symptoms may be relieved.

The patient should have a general physical examination and any other disease or disability should be corrected if possible. Chronic sinusitis often clears up when hyperacidity, constipation and gastro-intestinal diseases are corrected. The pediatricians have taught us the great value of proper diet and nutrition in children with chronic sinusitis.

The mucous membrane of the nares should be shrunken by topically applying 2 to 4 per cent solution of cocain on a cotton applicator and placing a thin cotton pledget between the middle turbinate and septum if necessary. Negative air pressure may be used to great advantage in removing the secretion from some sinuses. Alkaline sprays are useful for cleansing and removing crusts if one does not traumatize the mucous membrane. A luke-warm saline irrigation or siphonage cleans out the crusts and secretion from the nasal chambers and is soothing to the mucosa. Gently packing the middle meatus with a cotton tampon saturated with 20 per cent solution of argyrol is efficacious.

During the past two years the writer has applied the ultra-violet ray in the nares of these cases through a quartz rod. The hyperplastic mucous membrane was reduced and better drainage afforded in a large number of patients. It is a valuable therapeutic aid for rhinitis and sinusitis.

After careful observation has been made for a reasonable length of time, a thorough diagnosis has been made of the various sinuses by clinical symptoms, physical signs, irrigation, repeated trans-illuminations and roentgenograms, and no marked improvement has been achieved from local treatment, then the surgical treatment must be considered.

In the past ten years the majority of rhinologists have concluded that the maxillary sinuses are more frequently the habitat of chronic nasal secretion than any of the other sinuses, whereas during my internship we were taught that the ethmoids were the chief offenders. The ethmoidal sinuses are more frequently invaded by an acute infection than any of the other sinuses, but due to their position are more easily drained out in most cases. Ethmoiditis is usually the original source of infection to the antrum, which is temporarily cured with or without local treatment; but reinfection may occur, and polypoid degeneration from the overflow of pus or acrid secretions from the chronic antrums results.[2] These are the cases which apparently clear up entirely for a while, then light up with fresh symptoms on the slightest exposure.

The polypi which usually occur in these cases used to be removed with a snare and in a short while they returned, often larger and in greater numbers. The advent of the exenteration of the ethmoids with and without the removal of the middle turbinate improved and cured many of these cases, but still in others the polypi recurred in a more malignant form than before. The latter are the cases where the chronic infection is in the maxillary sinus.

Chronic sinus infection is often associated with vasomotor rhinitis and asthma. Even if it is secondary to the allergic condition, the infection should be eliminated if possible. During an acute attack of hay fever or asthma, operative procedures should not be undertaken; only temporary relief by shrinkage of the mucous membrane with cocain, adrenalin or ephedrin and application of the quartz rod with ultra-violet ray should be used. There is often no rhinologic evidence of sinus infection and trans-illumination and x-ray examinations are negative, yet in a few cases irrigation of the antrum has shown the presence of a purulent secretion. Skillern[3] states that when we encounter those cases of so-called vasomotor rhinitis, rose colds and the like, we may be dealing with a case the pathology of which is a hyperplasia of the mucosa of the maxillary sinus. Cauterization of the inferior turbinates, removal of the middle turbinates, and correction of

septal spurs and deviations often benefit this condition and improve the general health.

Coats[4] gives the nasal treatment for allergic cases as follows:

(a) To free the nose from any infection present. This usually means draining the maxillary sinuses, the anterior ethmoid cells and at times the sphenoids.

(b) In case of asthma where sensitivity cannot be demonstrated, search for local sensitive spots and remove tissue that may be responsible for reflex symptoms by pressure.

(c) Proper ventilation and drainage of the nose should be secured as a measure for restoring the patient's general health.

(d) The preparation and administration of autogenous vaccines are of benefit after appropriate surgical procedures to eliminate remnants of infection and to overcome bacterial sensitization of the mucous membranes locally and the general allergic condition.

(e) The branches of the fifth nerve supplying the nasal mucosa may be blocked or the sphenopalatine ganglion itself may be injected.

(f) All these measures may be indicated at times to combat contributing and complicating factors, such as the chronic bronchitis of asthma and the secondary infections in the latter stages of a hay fever attack. Allergic treatment should first be instituted and carried out and then, in case of failure, surgery may be tried.

The nasal septum is usually deflected in the majority of sinus infections so the first operative procedure is to correct any deformity that may be interfering with ventilation and drainage. Where there has been a marked obstruction, many of these infections will subside in due time.

The second operative procedure is to open the infected sinus or sinuses so that permanent drainage may be established, and to remove polypi and diseased mucous membrane lining the cavities if they are present. The fact that there have been so many different operative technics offered by our profession to accomplish a cure for chronic sinusitis shows that we are still in the stage of experimentation. It behooves us to err on the conservative side. Remember that a physician has never cured any person of disease. He can only aid nature in doing this job, and if he is not careful he will deter her in this accomplishment. The mucous membrane of the nose and sinuses has a valuable physiological function, so conserve all of it that you can.

When the antrum and other sinuses are infected on the same side, it is best to open the antrum first. The writer prefers to use local anesthesia and hospitalization, when practicable, with all sinus operations. A large opening is made under the inferior turbinate into the antrum. The turbinate is not disturbed any more than is necessary. The inner antral wall is removed from the floor below to the attachment of the inferior turbinate above. The cavity is carefully inspected with a Holmes naso-pharyngoscope. If polypoid degeneration or great hyperplasia of the mucous membrane is found, the antral walls are carefully curetted and the contents removed with small curved forceps. It is surprising how thoroughly this may be done with proper instruments which may reach the seat of all mucous polypi. If all parts of this cavity cannot be reached, as is true in a few cases, then an incision may be made in the gingival region and an opening made through the canine fossa. This surgical treatment of the maxillary sinuses not only removes the infection from this cavity, but often relieves the muco-pus in the superior meatus which drains from the ethmoidal sinuses.

I agree heartily with Dr. Skillern[5] on the ethmoid problem, "Give this infected area good aeration and drainage will take care of itself." Remove the middle turbinate except a small tip posteriorly and give the labyrinth time to be aerated and drained. It is better to lose any physiological function that a diseased middle turbinate may have than not to restore function to the ethmoidal sinuses. The writer has used argyrol tamponage in this area to great advantage after turbinectomy.

I do not think the ethmoidal sinuses can be properly treated by curetting between the middle turbinate and orbital plate. Adhesions soon form and this area is excluded from air more than before the operation.

The superior turbinate should rarely ever be removed, as it harbors the sense of smell. If its physiological function has been previously destroyed and the tissue is greatly degenerated, its preservation is not important. Shea[6] says the sense of smell is a subject for special consideration in ethmoidal surgery. The protection of the membrane lining the superior turbinate and the septum opposite it will preserve this sense. It is very embarrassing to the surgeon for the patient to lose this sense, but this will happen if the membrane lining the superior turbinate is destroyed.

The ethmoidal bulba and any outlying large

cells should be opened and gently curetted, but the chain of cells in the labyrinth should be left alone. This technic also lessens a great danger of intra-cranial complications which may result from blindly curetting in this irregular shaped cavity.

The sphenoidal sinus is the least infected of the nasal accessory sinuses. The chronic inflammation of the sphenoidal sinus is less commonly found alone than in association with the post-ethmoid group.[7] There are two types: suppurative and hyperplastic.

The surgical treatment consists of entering the ostia, stripping back the mucous membrane and biting the bone so that the anterior wall will be well open. If the ethmoidal sinuses are involved, the middle turbinate should be first removed. If not, only the posterior third should be snared off. In many wide open nares the sphenoid may be opened well without interfering with the turbinate. The hyperplastic membrane may be gently curetted from the walls of the sphenoid.

The intranasal treatment of chronic empyema of the frontal sinus has not been so satisfactory in the writer's experience as that of the other accessory sinuses. However, a frontal sinus of moderate size which is free from septa, and without extensive pathological changes in the lining mucosa or osseous walls, is usually amenable to treatment by the intranasal route. If the ethmoids are infected, too, as more frequently is the case, the middle turbinate should be removed.

I have found the frontal operation described by Halle to be most satisfactory. This enlargement of the naso-frontal duct throughout its entire course promotes drainage, permits a certain amount of curettage of the interior of the sinus and renders it fairly accessible to lavage. I leave a hard rubber tube drain in the sinus for ten days after operation. If the symptoms continue after careful post-operative treatment in a fair length of time, I do the external frontal operation as described by Lynch.

The writer has used the combination of intranasal sinus operations for the past few years in over a hundred cases with very good results. This combination has included submucous resection of the nasal septum, removal of the middle turbinate and opening and curetting the accessory sinuses. In using this method the operator must have good anesthesia and hemostasis, must not traumatize the surrounding tissue, must know his operative technic well and work quickly, and must not use intranasal packing. Occasionally it may be necessary to use a small wick of lubricated gauze in a sinus or nares. Hematomas are prevented by making a slit in the mucous membrane of the septum along the vomer. Secondary infections are rare, the patient is more comfortable, there is no more loss of blood than occurs by removal of packing.

The saving of time and expense of hospitalization is of great economic value to the patient. The criticism of the general physician that rhinologists have to do many nasal operations on their patients is also avoided. The post-operative treatment of intranasal accessory sinus surgery is very important and is fraught with many problems. The nares should be left alone for the first three or four days until the raw tissue begins to heal. Then the blood clots and scabs may be gently and gradually removed. The use of warm saline irrigation into the nose twice a day cleanses it out well. I apply 5 per cent mercurochrome solution into the nose and sinuses on a cotton swab once a day. In a week or ten days I prescribe a spray of camphor, menthol and oil of eucalyptus for the patient to use at home.

If adhesions occur they should be broken at once and a thin tampon should be placed between the raw surfaces until they are healed.

If granulations or hyperplastic tissue recurs in the sinuses it should be cauterized. Frequent observation with Holmes' naso-pharyngoscope is valuable. Do not be impatient. Give the sinuses several months to heal and you will realize that excellent results will be obtained by intranasal treatment in the same type of case in which formerly radical procedures were used.

SUMMARY

(1) The mucous membrane of the nose and accessory sinuses has a valuable physiological function. Hence, conserve all of it that you can. The nasal accessory sinuses are so arranged that air may enter each one through its opening. The permeability of these ostia affording aeration and drainage is of first importance in carrying on physiological functions.

(2) Observation of a patient with chronic sinusitis for several months, the trying out of local treatment and correction of associated diseases and deformities should be the rule of a rhinologist before operating upon the sinuses.

(3) The use of ultra-violet ray through the quartz rod is a valauble aid in treating chronic rhinitis and sinusitis.

(4) In cases of vasomotor rhinitis and hay fever associated with chronic sinusitis, always try allergic treatment first, then operate upon the nasal sinuses if necessary.

(5) Always correct a deflection of the nasal septum first, then open the accessory sinuses for proper aeration and drainage.

The maxillary sinus is the most frequently chronically infected and the sphenoid the least frequently of the accessory sinuses.

(6) The removal of the middle turbinate is usually all the surgery that is necessary to aerate and drain the ethmoidal sinuses. A large window in the naso-antral wall under the inferior turbinate and thorough curettement of the antrum are usually all the surgery required for this sinus. The sphenoid sinus can best be treated surgically by the intranasal route.

(7) Intra-nasal surgery does not effect as large a percentage of cures of chronic infection in the frontal sinus as with the other accessory sinuses. However, it is indicated in moderate sized frontal sinuses, free of septa, and without extensive pathological changes in the lining mucosa and osseous walls.

(8) The combination of intranasal operations at one time, when done with care and technic as stressed by the writer, are safe and of a great economic value to patients.

(9) The post-operative treatment after intranasal sinus operations is very important and the rhinologist must be patient and give Nature time to throw off the infection and re-establish the function of the sinuses before resorting to radical operations.

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DISCUSSION (*Abstract*)

Dr. Joseph B. Greene, Asheville, N. C.—As preventive treatment is the order of the day, I wish to confine my remarks to this important phase of the subject. It is thought by many that sinus disease in adults frequently has its inception in infancy and childhood. Measles, scarlet fever and other forms of infection to which children are subject attack the nasal cavities with special force. Frequent cold in the head, usually associated with adenoids and diseased tonsils, is often the starting point of sinusitis, which develops later in life as frank sinusitis. This should remind us that these conditions in the young should not be ignored, but should receive appropriate treatment.

Dr. Stucky has often reminded us of the importance of a well-balanced diet with due regard to vitamins in the prevention of infection in the nose and throat. The prevalence of this condition in under-nourished children and those indulging in food containing too much sugar and starches is too evident to need further emphasis from me.

Children subject to frequent attacks of cold in the head should have their tonsils and adenoids removed. This is the advice of Dean, who has given special study to sinus disease in children. He also emphasizes diet as a factor in the prevention of this disease.

It is my practice to apply the Dowling pack, 10 per cent fresh argyrol, to the nose in cases of sinusitis for a period of twenty to thirty minutes every day until the condition is relieved. The mother is told to drop into the nose a few drops of 1 per cent ephedrin compound, containing a little menthol in oil, every four or five hours. The more severe types of acute infections require hot saline irrigations every few hours, using all necessary precautions to protect the middle ear.

Dr. Fletcher D. Woodward, Charlottesville, Va.—Most of us are quite in accord with Dr. McDougall's views on the treatment of sinuses. One thing that I wish to bring out is that during the treatment we are able to study them and reach certain definite conclusions as to their need of operation. In this study many men have been using lipiodol. Occasionally we have obtained very important information from its use, but it has led us astray at times. I do not place so much dependence on injections of lipiodol from a diagnostic standpoint, as I was inclined to do at first.

After we have determined what procedure to use we have yet to carry it out. First in importance in treatment is aeration and drainage. When that has been accomplished and the case does not progress satisfactorily we must take another step. We should either attack the maxillary according to the method of Dr. McDougall or we should remove the turbinate and ethmoid and treat with argyrol tampons. Then for another period of several months we should attempt nothing more, but if we have not gotten results we should do radical surgery, and then you have done as much as you can do.

There are certain limits to surgery. It does not cure in itself; it only helps the patient to get well. We have received a great deal of blame because we do not cure all cases of chronic sinus infection. We can never do this because the disease is too extensive and we have to be content with putting the patient in as good condition as we can and keeping him in that condition. We cannot hope for complete cure in bad sinus infection, particularly the old chronic cases.

In the use of the ultra-violet ray I have not had such happy results as Dr. McDougall. I tried it, but I have given it up because I could see no definite benefit as a result.

Good anesthesia is most important in operative work. Without it you will have much trouble.

Dr. E. B. Cayce, Nashville, Tenn.—I should like to discuss the paper from one standpoint, and that is the principle of packing and irrigation. Man is not amphibious by nature and any watery or aqueous solution is an irritant to the membrane. The less we use aqueous solutions in the nose the better the results will be. There is a general tendency away from packing, and that is a distinct advantage.

These patients have some psychic disturbance in regard to the discharge from the nose. We should tell them that they will have some discharge, if there is much infection, but that after drainage and aeration is instituted it is not doing them any harm. Patients may have an immense amount of discharge and not pay any attention to it, but after the condition is called to their attention they get the idea of focal infection and imagine they are being poisoned. We should tell these patients that they may expect more or less discharge from the nose, but that it will do them no harm.

Dr. John T. Crebbin, Shreveport, La.—The essayist has aptly brought out the point that we should keep our patients under careful observation and make a thorough examination before deciding on any operation.

About twenty-five or more years ago, the late Dr. H. M. Fish, of New Orleans, called attention to the use of tampons of cotton saturated with protargol, introduced well up into the nose, for treating sinus conditions. I believe he was the first to suggest this method. Since then we are using other solutions, neosilvol, 40 per cent, being the most satisfactory of this group. The patient is instructed to bend as low as possible for at least fifteen minutes while the solution remains in the nose.

I agree that we should never pack an antrum following an operation. We do not use splints or packs after a submucous or after an antrum operation. Certainly our patients are more comfortable.

Frequently, following a radical maxillary operation, the other involved sinuses clear up. This suggests the inadvisability of operating upon the other sinuses until the maxillary has been eliminated. Results of this nature help to refute the claim that the maxillary antrums are reservoirs.

We have used vaccine therapy quite extensively, but without great success. In some cases there was an aggravation; in others, no results at all, and a few were benefited temporarily.

The object of all of these operations is aeration and drainage. If these were not closed cavities there would be no need to operate and many of us would be soon out of a job. Submucous resection, plus intranasal treatment, or surgery, will cure many cases of frontal sinusitis without other measures.

Relative to post-operative treatment my advice is "hands off," for I am confident we have better results if we let Nature do the work.

Dr. G. M. Maxwell, Roanoke, Va.—I wish to ask Dr. McDougall, where we have an infected sinus with a bad septal deviation, is it better to do a submucous resection with the infected sinus lying by or to try to get rid of the sinusitis first and then do the submucous resection?

Dr. McDougall (closing).—I did not bring out in detail the treatment of children. It really is a separate entity from the treatment of adults. They have to have special treatment, and the technic Dr. Greene outlined is excellent. These infections are often overlooked in children and that is the time that the future chronic sinusitis in adults is beginning and can more easily be eradicated. Sinusitis is as frequent in children as in adults.

I agree with Dr. Woodward about lipiodol. We used it for a while in a few cases, but did not find it very satisfactory. One can make a proper diagnosis of sinusitis without it.

I do not think that many rhinologists have given the ultra-violet ray a fair trial in the treatment of these diseases. I was skeptical of it at first, but after using it for over two years, I believe it to be a valuable therapeutic agent in our line of work.

Dr. Woodward truly said that we cannot cure all types of sinusitis completely. There are many diseases we cannot cure and some of these hang on indefinitely, but there is no use in disfiguring our patients and destroying the sinuses merely to try to cure a little postnasal discharge that really does not do much harm to the patient. We become too nervous about these cases, and just because they do not clear up we try one line of treatment after another. Patients often become neurotic from this nasal condition. You have to use some psychic treatment. Send them off somewhere, to Florida or to Asheville in order to change their environment. Sometimes that does more good than keeping them in your office and giving them treatments day after day.

I agree with Dr. Crebbin's discussion of irrigation. If you are not careful you will traumatize the tissues and do harm to the middle ear. We do not irrigate all cases. One has to use judgment with each patient.

He also mentioned vaccines. We have had about the same results. We doubt that they do any good, although some of my colleagues think they get wonderful results from autogenous vaccines.

In a case that has been markedly obstructed by a deviated septum, if the sinuses have a good chance to drain through the ostia when a submucous resection has been done, we may do only the submucous operation and stop. However, if we find hyperplastic and polypoid tissue, it is best to make an intranasal opening into the sinus. But many times we give the patient a chance to get well by the operations of Nature alone.

The speaker strongly advises against the use of atropin with patients who have purulent sinusitis. It dries the secretions, forms thick scabs and greatly hinders drainage.

CLINICAL CONSIDERATION OF ACHLORHYDRIA*

By ALLEN H. BUNCE, M.D.,
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There is a group of clinically related disturbances in which we find an absence of hydrochloric acid in the gastric juice. Achlorhydria forms the common denominator which holds this group together. It may be present from birth or may develop at any time during life and ante-

*Read in Section on Medicine, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

date any other symptom of derangement. The acid may reappear after treatment or the achlorhydria may persist even after the patient is clinically well. Therefore, although it is often valuable in diagnosis and prognosis, it may prove to be, as Christian[1] has stated, merely a "confusing factor."

Hydrochloric acid is normally present in the gastric juice from earliest infancy to old age, irrespective of the presence of food in the stomach.[2 3]

The total amount of gastric juice secreted by an adult after an average meal amounts to 700 c. c. being divided into 200 c. c. the first hour, 150 c. c. the second hour and 350 c. c. during the third, fourth and fifth hours.[4]

Achlorhydria is normally found in approximately 1.5 per cent of children and 4 to 10 per cent of adults with an increasing percentage as age advances.[5 6 7 8] In a great majority of patients with achlorhydria histological changes of an inflammatory character may be demonstrated in the gastric mucous membrane and even when no histological changes are found it is quite probable that there are chemical changes in the secreting cells.[3]

SOME DISTURBANCES ASSOCIATED WITH ACHLORHYDRIA

Pernicious Anemia.—In any discussion of achlorhydria pernicious anemia must be considered first, because it is generally conceded that an absence of acid in the gastric juice is always found in this disease. Many cases have been reported showing definitely that it may precede the anemia for years. On account of the large amount of recent work on pernicious anemia we do not propose to give a lengthy discussion here, but shall briefly review two theories as to its etiology.

In a study of this subject Knott[9] says:

"In Addison's anemia and subacute combined degeneration of the cord there is a double invasion of the small intestine; from above by catarrhal and pyogenic organisms, and from below by fecal and putrefactive bacteria. In one or both groups hemolytic bacteria may occur. . . . . I think there is no question that in all cases of complete achlorhydria the small intestine is invaded by bacteria both from above and below; and I put forward, very tentatively, the suggestion that the reason for complete failure on the part of so many workers to isolate a specific bacterium in Addison's anemia arises from the fact that there is no specific organism, the toxins being products of the grossly fecal flora, which comes to occupy the small intestine and in which one may find varying mixtures of hemolytic and neurotoxic strains."

This is supported by numerous reports of the cultivation of hemolytic bacteria from the secretions of the stomach and small intestine of patients and the post-mortem finding of atrophic changes in the gastric mucous membrane with destruction of the glandular elements and the presence of large groups of bacteria, mainly streptococci, in the submucosa.[10]

Contrasted with this theory is the more recent report of Castle and Locke.[11] They suggested the possibility of deficient gastric digestion of protein as a cause of the anemia and concluded from their experimental studies that the secretion of the normal stomach alone, or through its action on foods, can produce some substance capable by oral administration of definitely benefiting certain cases of pernicious anemia. They advanced the theory that achlorhydria in pernicious anemia produces a deficiency causing the disease through a failure of the patient's stomach to produce the substance apparently formed during digestion in the stomach.

Sprue.—Achlorhydria is not a constant finding in sprue. If present it usually occurs late in the disease rather than early as in pernicious anemia. Although cases have been reported which showed degenerative changes in the spinal cord and peripheral nerves, these are not characteristic findings in sprue. The anemia is usually of the aplastic type. More frequently the gastro-intestinal symptoms predominate.[12 13]

The type usually seen in this section is illustrated by the following case report:

A white man, aged 65, came to us complaining of loss of weight and strength, anorexia, diarrhea, "sore mouth" and indigestion. He had lost 88 pounds during the previous nine months, his usual weight being 220 pounds. He was scarcely able to walk up a single flight of stairs. The skin and mucous membranes showed extreme pallor, but no jaundice. There was a generalized subacute stomatitis, but the tongue, although it had a small ulcer near the tip, did not have the characteristic "slick" appearance seen in advanced cases of pernicious anemia. His blood pressure was 90/60. His heart was apparently enlarged. His reflexes were sluggish but not absent. Bone conduction and joint sensation were normal, there being no evidence of spinal cord degeneration.

His blood examination showed red cells 2,600,000; white cells, 4,400 per cm.; hemoglobin, 55 per cent; differential count normal; moderate anisocytosis; no nucleated red cells; calcium, 6.2. There was an absence of free hydrochloric acid in the stomach contents and the total acidity was 12. Cultures from the stool showed *Monilia psilosis*.

A diagnosis of sprue was made. He was placed at rest in bed and given a high protein diet in contrast to his previous diet, which was largely carbohydrates. At first this consisted chiefly of skimmed milk. He made a rapid and uneventful recovery, his weight going from 132 to 155 pounds within the first sixteen days. Six weeks after the first examination his red cells

were 3,080,000; white cells, 7,800 per cu. mm.; and hemoglobin 70 per cent. He continued to improve and has now remained clinically well for a period of three years.

Hypothyroidism.—That achlorhydria and anemia may be produced by lack of thyroid secretion has been demonstrated both experimentally and clinically. In Stone's series of twenty-three patients with an average basal metabolic rate of minus 30.5 per cent he found an achlorhydria in 25 per cent of sixteen in which the gastric contents were examined. All re-examined cases showed a persistence of the achlorhydria.[14]

A case which was somewhat puzzling at first was the following:

A white married woman, age 38, came to us complaining chiefly of shortness of breath and marked constipation alternating with attacks of diarrhea. She was overweight and the skin and mucous membranes were extremely pale, but not jaundiced. She was unable to walk across the street or up a single flight of steps without marked evidence of fatigue accompanied by pain in the precordial region. She had attacks of numbness and tingling, especially of the hands, and attacks of dizziness with temporary blindness, frequently dropping dishes and other things which she was attempting to carry. A sensation of swelling with tightness of the skin was very troublesome. She constantly complained of being cold. Examination was essentially negative except for the overweight and anemia and marked swelling and tenderness of the gums and soreness of the tongue. The blood examination showed red cells 2,300,000; white cells, 4,200 per cu. mm.; hemoglobin, 30 per cent; differential count normal; marked anisocytosis, poikilocytosis and a few nucleated red cells on each of several stained smears examined. There was no hydrochloric acid in the stomach contents and the total acidity was only eight. She had a basal metabolic rate of minus 30 per cent.

She was placed in the hospital, put on a liver diet, and given drachm doses of dilute hydrochloric acid with meals. There was only slight clinical improvement with an increase in red cells to 3,000,000 and hemoglobin to 65 per cent at the end of three weeks. This treatment was persisted in for this length of time since a consultant considered the case probable pernicious anemia. However, failing to get a satisfactory response from the liver diet, we felt safe in ruling this out as a diagnosis. She was then placed on dessicated thyroid glands, 6 grains daily, and the hydrochloric acid continued. In the meantime, she was allowed to return home and to omit the liver diet. Her improvement was remarkable. Her recovery was so complete that after three months' treatment she was able to perform her household duties and take an active interest in the social life of her community, although the achlorhydria persisted. Her anemia, digestive disturbances and parasthesias disappeared entirely. She has now been clinically well for more than a year.

An Unclassified Deficiency Disorder.—Another clinical picture which we have been unable to explain is illustrated by the following case report:

A physician's widow, aged 45, came to the office complaining of a burning sensation of the tongue, "gas on the stomach" and indigestion. She was overweight and short of breath on exertion. She had dryness of the hands with thickening of the skin over both the palmar and dorsal surfaces as though she were accustomed to manual labor, which she was not. Her red cells were 4,200,000 per cu. mm.; hemoglobin, 80 per cent; white cells and differential count normal. There was a total absence of free hydrochloric acid in the stomach contents, even after histamin injection. Her basal metabolic rate was normal. X-ray studies of the gastro-intestinal tract and gall bladder, including the Graham test, were all negative. She had several apical abscesses. After the removal of these and the administration of drachm doses of dilute hydrochloric acid with meals she made considerable improvement, but at the end of two years' observation she still found it necessary to continue the hydrochloric acid, during the taking of which the burning sensation was lessened, but not entirely absent. She still had an absence of stomach acid, but had not developed a greater degree of anemia.

We have had twelve similar cases, eight being women and four men, with ages varying from thirty-eight to fifty-five. One of the men showed eight degrees of free acid in the beginning of treatment, which increased to eighteen degrees six months later. One of the women showed a normal amount of free acid in the stomach contents. In all the others achlorhydria was constantly present. The objective findings were dryness and increased wrinkling of the skin over both the palmar and dorsal surfaces of the hands, and the subjective symptoms a burning sensation of the tongue or the roof of the mouth with numerous digestive disturbances. One patient complained chiefly of dryness of the tip of the tongue. There was no atrophy of the papillae of the tongue in any of the patients.

These cases led us to believe that we were dealing with a deficiency group of disturbances in which achlorhydria played an important role. They presented some symptoms of pellagra, but such a diagnosis was impossible without a wide stretch of the imagination. Of course, they might have been classified as "early pellagra" or "incipient pellagra," but it seemed more reasonable to group them as unclassified disorders probably having their origin in an as yet undetermined nutritional deficiency.[15]

SUMMARY

Achlorhydria is an important finding in a group of related diseases which are probably the result of a disturbance of nutrition. The clinical pictures are not always clear cut. In pernicious anemia, in addition to the signs and symptoms, we now have the therapeutic test consisting of the liver diet. The diagnosis of sprue depends on the entire clinical picture. In

hypothyroidism the basal metabolic rate, together with the response to thyroid therapy, differentiates the disorder. Pellagra may be diagnosed by the triad of classical symptoms involving the skin, gastro-intestinal tract and nervous system. It is controlled, according to Goldberger, by the factor P in the diet. However, we still have a considerable group of patients with various clinical manifestations which cannot be definitely classified. "Pellagra sine pellagra" is an unsatisfactory term. It is probable that nutritional deficiencies may be caused by the lack of a variety of substances in the diet and that these present a multiplicity of clinical manifestations.

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DISCUSSION (*Abstract*)

Dr. Cabot Lull, Birmingham, Ala.—The term "achlorhydria" should be defined. It seems that in the text books there is confusion. Often this term is used interchangeably with the term "achylia." Dr. Bunce has used the etymological definition and we are not left in any doubt as to his meaning. Some authors even go so far as to say that achlorhydria may mean only a diminution of the hydrochloric acid; that it is one of the early stages in the development of the condition of achylia. The essayist tells us that achlorhydria is found in about 1.5 per cent of children and that 4.1 per cent of adults show it. I assume that he means well persons or at least persons who are not known to be definitely ill. This statement is very commonly made and yet only today we heard Dr. Rehfuss make the statement that he had serious doubts whether or not any normal person showed persistent absence of hydrochloric acid. He issues a challenge to find the associated condition.

Dr. Bunce has given us a very general clinical consideration of the subject, discussing only a few well known diseases in which hydrochloric acid is absent as a rule. He might have enlarged this list considerably, but it seems that he selected those that he considered merely typical and illustrative. We assume, of course, that all the resources of diagnosis were exhausted before he classified them as he did.

Achlorhydria is a laboratory finding in a syndrome, and not a disease, and our success in handling patients of this nondescript group depends not only on our use of hydrochloric acid, but on our handling of the case in the matter of diet and hygiene and especially, I believe, in the use of psychotherapy.

Our most satisfactory case of achlorhydria is the person who is well along in years and develops a diarrhea with no ascertainable cause, that is, no definite bowel infection. There we often have brilliant results almost immediately from the use of a proper dosage of hydrochloric acid. The cases Dr. Bunce has described, it seems to me, must be under the supervision of the clinician for a very long time, long after the immediate presenting symptoms are relieved. Only by long observation and careful study can we come to a final satisfactory diagnosis. Unfortunately, the last clinician to see the patient often has the good fortune to find that what we regarded as simply an achlorhydria has actually been a slowly progressive disease such as Dr. Bunce indicated might be the case. The commoner conditions are pellagra, carcinoma of the stomach or primary anemia.

The two things that I get from the paper which we must emphasize are: first, that achlorhydria is a symptom or part of a syndrome and must be regarded as such until definite proof of the presence of some underlying disease is forthcoming, which I believe is usually the case in the course of time; secondly, that the handling of these cases is not always successful by the mere use of hydrochloric acid, but depends also in large measure on regulation of diet, a careful hygiene and psychotherapy.

Dr. M. S. Dougherty, Atlanta, Ga.—Since the practical introduction of gastric analysis in about 1870, the subject of achlorhydria in its relation to varius diseases has been intensely interesting. Achlorhydria may be considered as congenital or functional in origin or may be due to general or local organic disease.

Of the medical diseases presented in this paper, I am intensely interested in the group that Dr. Bunce has described as an unclassified deficiency disorder. In my experience in the Wesley Clinic of Emory University Medical School I have seen a large number of just such cases. The prominent presenting symptoms are usually a soreness of the mouth and tongue, digestive disturbances and burning of the rectum. Constipation is complained of in by far the largest percentage of cases and diarrhea is relatively infrequent. In this series of cases certain clinical observations stand out. Most of the patients are of a poor farming class; infection of the teeth and tonsils is a prominent finding; practically all the patients live on a high carbohydrate and fat diet, eating bread, molasses, side meat and a few vegetables, mostly Irish and sweet potatoes. Most of these patients are above forty years of age. Of course, some of them present the definite clinical pic-

ture of pellagra. However, many do not. Pellagra cannot be considered to develop as a full blown disease, presenting the classical symptoms at the outset. Hence, it is reasonable to consider many of them as early pellagrous involvement.

In one case the presence of chronic amebiasis was found after repeated and careful examination of the stools. Unquestionably some of these cases are explained by deficient or ill-balanced diet, vitamin and chemical deficiencies resulting. It does not seem unreasonable to assume that this deficiency could interfere with the normal chemical activity of the cells secreting hydrochloric acid.

Considering achlorhydria in its relation to the various diseases in which it is found, it is my opinion that it is a coordinate or concomitant part of the general functional derangement resulting from the organic disease in which it is found.

A STUDY OF HYPERACIDITY*

By MARTIN E. REHFUSS, M.D.,
Philadelphia, Pa.

Hyperacidity is a symptom which has engaged the attention of many medical men. A study of the literature reveals the confusion regarding the exact significance of this symptom. In order to avoid the difficulties which arise in its consideration, we must confine ourselves to the actual condition which is demonstrated in the gastric contents. In other words, hyperacidity is always a demonstrable increase of acid over figures normally encountered, and is in no wise to be confused with the subjective symptom. Let us for a minute consider several facts regarding gastric physiology.

It is now believed that the normal gastric secretion, when secreted above a minimum rate, shows a constant acid of nearly 0.05 per cent. A series of observations report figures practically as high from observers all over the world, and Kaminsky in rabbits, and Riazaneff in cats, found figures approaching 0.5 per cent hydrochloric acid. On the other hand, a clinician, dealing as he does with carbohydrate meals, gruels and toast, finds figures in health which are much below this figure. We found that if 0.5 per cent hydrochloric acid is introduced into the normal stomach, it is rapidly brought down to an optimum approximating 0.25 per cent. From another angle, Boldyreff found that 0.05 per cent hydrochloric acid is practically never introduced into the duodenum in that concentration, and if it is, it is a true duodenal irritant. Throughout the world today it is generally believed that the acidity of the native secretion is very much higher than that which is encountered with ordinary test meals. The explanation of the lowered acid of the meal is due not only to the phenomenon of dilution, but also to the mechanism of automatic regulation by means of the regurgitation of the pancreatic secretion. To Boldyreff clearly belongs the credit for outlining by animal experimentation what he called the self-regulation of gastric acidity. When examining the combining value of all the fluids that might have access to the gastric contents (gastric mucus, pyloric juice, Brunner's juice, succus entericus, bile from the gall bladder, and the pancreatic secretion) he found that the pancreatic secretion was about ten times more active than any other fluid passing the upper digestive tract. In several ways we were able to prove the presence of this pancreatic regurgitant mechanism. More recently the English observers, notably Bolton and Goodhart, attempted to demonstrate the same mechanism by an estimation of the neutral chlorids. This controversy is still at its height in England, and has already aroused the interest of some observers in this Country. I do not propose to argue for the admissibility of that data, inasmuch as I am persuaded by other information that there is little doubt regarding the existence of that mechanism.

Hyperacidity practically always argues for a functionally active mucous membrane. It is scarcely conceivable that such a condition should occur in a membrane which has been badly damaged. The most recent conception of the term would argue for a condition in which the normal neutralization does not occur. This is possible either through excessive tonicity of the pyloric center or high tonicity of the stomach wall as a whole. It is, of course, possible that an excessive amount of secretion over the needs of the ordinary stomach might present hyperacid figures.

One of the most interesting phenomena which we are called upon to study is the varying way in which various foods act with the human stomach. While the average normal acid response to cereals and carbohydrates is in the neighborhood of 60-70 (0.2 or 0.3 per cent hydrochloric), the normal response to protein foods is totally different. We were able to point out that the average highest total acidity in twenty-five separate studies with beef products was 120 (0.43 per cent hydrochloric), with lamb and

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*Read in Section on Gastro-Enterology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

lamb products 135 (0.49 per cent hydrochloric), with 75 observations on fish 0.46 per cent. In other words, with meat products acid figures are normally encountered which cover the clinical range of hyperacidity. These findings establish the fact that there is no absolute pathological increase in titrable acidity which has not been encountered normally. Furthermore, a certain proportion of normal individuals react to a given stimulus with an exceptionally high acidity. For years I have insisted upon the fact that there is a normal type of hyperacid response. It represents the normal variation and all individuals can be fitted into groups from the secretory standpoint precisely as they can be fitted into various forms of habitus. Further studies prove that an individual under normal conditions remains remarkably true to type. It is, therefore, interesting to note that in studies on over two hundred normal men: 7.3 per cent of the bread and cereal group; 39.3 per cent of the pies, cakes and pastry group; 91.5 per cent of the fish group; 76.8 per cent of the meat group; 20.8 per cent of the ice cream and beverage group; 22.1 per cent of the egg group; 36.1 per cent of the nuts and fruits group; 44.6 per cent of the milk and cream division; and 8 per cent of the candy studies, revealed at some point in their digestive evolution an acidity of 0.365 per cent hydrochloric acid, or over.

Bread and cereals give the lowest percentage of high acid response in health, and fish and meats give the highest. Inasmuch as clinicians commonly test the stomach with carbohydrate meals, it is apparent that a standard meal in which the quantity of food fluid is fixed offers a criterion for comparing gastric work. Our own findings, those of Bennett and Ryle, Apperly and Sellmens, are all in accord insofar as the characteristics of the normal human response to carbohydrates are concerned. We recognize variations, but the great majority of the human race falls within a definite group which has been pretty well established. I am still skeptical as to normal achlorhydrias. I still believe that a careful study will reveal some abnormality in their make-up. In Apperly's normal group one student had achlorhydria with each of two examinations, and his father died of pernicious anemia; another student with a similar finding had a mother suffering with rheumatoid arthritis and had a similar condition. In our series this was an exceptionally infrequent finding. The alteration in the normal response which characterizes hyperacidity is a rather striking one. It may occur in the beginning of the test meal, and is not frequently due to nervous disturbances. I believe these to be vagal in character and they are called larval hyperacidity. A true digestive hyperacidity is an excessive acid concentration during the height of digestion, but the most characteristic form is the late hyperacidity seen in any pathological condition which was near the pylorus, of which the most common is duodenal ulcer.

There is no question, to my mind, that high acid responses are important when obtained with a Ewald meal. Their exact significance is certainly not clear, but in operatively demonstrated duodenal ulcer Moynihan found 72 per cent with this response, and in my first group of one hundred duodenal ulcers I found the expression of hyperacidity to be 78 per cent, figures out of all proportion to any known group of normal responses. Just what the significance of this high acidity is, how it comes about, and what it means, is not clear, but I propose in this paper to discuss one phase of the problem which we are at present studying. Before going into that situation, however, I should like to call attention to the extraordinary difference in food combining power.

If 75 grams of raw chopped beef are added to 150 c. c. of 0.5 per cent hydrochloric acid, figures approximating 90-100 total acid, or 0.365 per cent hydrochloric and free acid of 32, or 0 114 per cent, are obtained. In other words, there is absorption, neutralization and also reduction in acid values by simple admixture alone. If, however, an artificial pepsin acid mixture containing 1 per cent pepsin in 0.5 per cent hydrochloric acid is added to ground beef, using 100 grams of beef to 100 c. c. of the acid mixture, at fifteen minutes the total acid figure is 104 and the free acid 39. In three hours the total acid is approximately the same, but the free acid is only 5

Lamb alone, with the usual 75 grams and added to 150 c. c. of 0.5 per cent hydrochloric acid, gives an acid mixture which on the average during several hours shows an acidity of approximately 0.35 per cent and 0.14 per cent hydrochloric acid.

If we use veal, and treat it as we treated beef, with the pepsin hydrochloric acid mixture, in fifteen minutes the total acid is 107, and the free acid 35. In three hours the total acid is slightly reduced and the free acid is only 4. In these mechanical digestive experiments,

which are incubated, it is apparent that a very marked reduction in free acid occurs. If we prepare mixtures of various foods and add the 0.5 per cent hydrochloric and 1 per cent pepsin mixture, in proportions of 25 grams of the food, and 50 c. c. of the solution, we get the following figures.

A

INCUBATED

No. 1—Beef, ground and cooked, with 3 tablespoonfuls of water, 100 grams to 200 c. c. No. 5 mixture, 10 c. c. samples diluted with 10 c. c. of water, titrated with N/10 NaOH. Thoroughly stirred after each sample is taken.

	Total Acidity	Free HCl.	Vol. or Bulk
15 minutes	104.0	39.0	280 c. c.
30 minutes	99.0	35.0	
45 minutes	97.0	25.0	
1 hour	98.0	22.0	
1 hour and 15 minutes	98.0	20.0	
1 hour and 30 minutes			
1 hour and 45 minutes	99.0	19.0	
2 hours	100.0	10.0	
2 hours and 15 minutes	104.0	15.0	
2 hours and 40 minutes	108.0	8.0	
3 hours	104.0	5.0	

B

No. 2—Veal. Prepared and Treated Like Beef No. 1

	Total Acidity	Free HCl.	Vol. or Bulk
15 minutes	107.0	35.0	360 c. c.
30 minutes	102.0	24.0	
45 minutes	100.0	25.0	
1 hour	98.0	14.0	
1 hour and 15 minutes	96.0	14.0	
1 hour and 30 minutes			
1 hour and 45 minutes	95.0	13.0	
2 hours	93.0	8.0	
2 hours and 15 minutes	93.0	5.0	
2 hours and 40 minutes	94.0	4.0	
3 hours	97.0	4.0	

C

No. 3—Pork. Prepared and Treated Like Beef No. 1

	Total Acidity	Free HCl.	Vol. or Bulk
15 minutes	98.0	35.0	350 c. c.
30 minutes	94.0	31.0	
45 minutes	94.0	24.0	
1 hour	93.0	20.0	
1 hour and 15 minutes	90.0	20.0	
1 hour and 30 minutes			
1 hour and 45 minutes	93.0	13.0	
2 hours	91.0	15.0	
2 hours and 15 minutes	97.0	11.0	
2 hours and 40 minutes	94.0	8.0	

D

No. 4—Lamb. Prepared and Treated Like Beef No. 1

	Total Acidity	Free HCl.	Vol. or Bulk
15 minutes	103.0	40.0	350 c. c.
30 minutes	102.0	37.0	
45 minutes	103.0	33.0	
1 hour	96.0	30.0	
1 hour and 15 minutes	100.0	24.0	
1 hour and 30 minutes			
1 hour and 45 minutes	102.0	17.0	
2 hours	108.0	19.0	
2 hours and 15 minutes	102.0	15.0	
2 hours and 40 minutes	100.0	13.0	
3 hours	102.0	11.0	

E

ROOM TEMPERATURE

No. 1 Mixture. 1% Pepsin in 0.5% HCl.
After 1 hour

Food	Am't. in grams	Acid sol., c. c.	Total acid	Free HCl.	Vol. or bulk
Potato (mashed)	25	50	115.0	75.0	
Crackers (ground) (soda)	25	100	154.0	31.0	Test unsatisfactory
Apple (raw, ground)	25	50	128.0	102.0	
Beef (raw, chopped)	25	50	128.0	0.0	10 c. c. specimens titrated with N/10 NaOH.
Egg (whole, raw)	25	50	112.0	16.0	
Above egg after 2¼ hours			117.0	14.0	
Milk	25	50	107.0	37.0	
Lima beans (fresh) (mashed)	25	50	99.0	42.0	
String beans (fresh) (mashed)	25	50	97.0	76.0	
Ice cream (peach)	25	50	120.0	32.0	
Raw beef (chopped)	25	50	127.0	0.0	
Raw beef (chopped)	25	100	141.0	33.0	
Raw beef (chopped)	25	200	142.0	76.0	

All food stirred for two minutes after adding acid solution.

F

ROOM TEMPERATURE

No. 2 Mixture
In 1 hour

Food	Amount in grams	Acid sol., c. c	Total acid	Free HCl.	Vol. or bulk
Egg yolk	25	50	137.0	0.0	75 c. c.
Egg white	25	50	100.0	15.0	75 c. c.
Whole egg	25	100	128.0	25.0	125 c. c.
Whole egg	25	200	138.0	54.0	225 c. c.
Eggs Slightly Beaten					
Milk	25	100	120.0	30.0	
Milk	25	200	127.0	42.0	

10 c. c. specimens titrated with N/10 NaOH.

G

ROOM TEMPERATURE

No. 3 Mixture
In 1 hour

Food	Amount in grams	Acid sol., c. c	Total acid	Free HCl.	Vol. or bulk
Cooked apples (apple sauce, sweetened)	25	50	120.0	89.0	75 c. c.
Cooked rice (rice pudding, made with milk and sweetened)	25	50	116.0	24.0	75 c. c.
Bread	25	50	120.0	27.0	75 c. c.
Raw tomato	25	50	120.0	73.0	75 c. c.
Stewed peaches (sweetened)	25	50	122.0	80.0	75 c. c.
Raw peach	25	50	130.0	84.0	75 c. c.
Raw pear	25	50	115.0	81.0	75 c. c.
Raw banana	25	50	109.0	61.0	75 c. c.
Cooked washed fresh peas	25	50	103.0	34.0	75 c. c.
Peas, as above	25	100	120.0	67.0	125 c. c.
Peas, as above	25	200	129.0	86.0	225 c. c.

10 c. c. specimens titrated with N/10 NaOH.

Yet again we see the remarkable differences in the ability of various foods to combine with acid, so that undoubtedly in individuals with a tendency to hyperacidity certain foods, eggs, for instance, when mixed with a hydrochloric acid pepsin mixture, nearly always reveal an almost total absorption of free acid when studied *in vitro*. In the human stomach, however, we are contending with not only the effect of the food on the certain volume of secretion, but on the changing volume which is dependent upon the stimulatory effect of the food in question. We are, therefore, in a position where we must consider two problems: (1) the essential stimulating effect of foods, certain of which produce undoubted hyperacid responses; and (2) the very obvious ability of these foods to fix a certain amount of the acid secretion.

A little over one year ago I was interested in the question, to what degree the tonicity of the pylorus influences the production of hyperacidity. Bolton, in particular, was of the opinion that the increased tonicity of the pylorus, by preventing the normal pancreatic regurgitant mechanism, was responsible for ordinary clinical hyperacidity. My own experience suggested that this was the explanation in some instances, but it could not be reconciled with other phases of the problem. I, therefore, constructed a gastro-pyloro-duodenal tube by means of which it was possible to maintain patency of the pylorus and still obtain specimens from the antrum of the stomach. Our procedure was comparatively simple, and Dr. Eads carried on this work with me. We first placed one fractional tube in the most dependent portion of the stomach at or near the gastric antrum and obtained the typical gastric response of pulverized toast and tea at that point. We then passed the gastro-pyloro-duodenal tube under fluoroscopic control, placed in such position that the specimens were aspirated at or near the same position, the difference being that there was a free communication between the antrum and the second part of the duodenum. Some of these results were reported before the American Gastro-Enterological Association. We have since made further studies. The subject is by no means completed, but there is sufficient evidence to prove that at least in a proportion of cases pyloric tonus plays the most important role.

So far our responses can be divided into three groups: one in which the hyperacid response is practically cut in half. In practically every instance the reduction in acid is accompanied by a reflux in bile, so that there has been duodenal regurgitation. In a second group the findings are not typical, and in a third group there were several cases where no change was noted. At first this finding was disappointing, but I am convinced that all of these findings are exceptionally important. In one case in particular, in the third group, where an open pylorus failed to reduce the high acid response, x-ray studies suggest what I believe to be the explanation, namely, that hyper-tonus of the entire gastric musculature can act as effectively as can isolated increase in pyloric tonus in preventing regurgitation. There is still a great deal of work to be done, but I feel confident that there is a group of hyperacid cases in which the cause of the syndrome is exaggerated tonus.

When we turn to the physiologist for an explanation of this phenomenon we are met with the amazing statement that a stimulus applied to almost any afferent nerve in the abdomen can alter pyloric tone (Wheelom and Thomas). We are further taught today that both the vagus and the nervous group possess stimulatory and inhibitory fibers. The reconstruction of the work done on the pylorus of animals by Wheelom lends color to the belief that a phase normally occurs at which duodenal regurgitation is most favorable. That this delicate mechanism, so admirably poised in health, can be altered in disease must be accepted without question. Furthermore, its intimate nerve association suggests the multiplicity of factors which might induce clinical hyper-acidity. The most important, and perhaps the most persistent group, are the benign lesions at or near the pylorus. Of these the most important is duodenal ulcer, but we cannot escape the fact that emotional disturbances as well as far-reaching conditions in the abdomen, involve every portion of the digestive tract, and reflexly bring about these same results. I feel that this condition can be measured. It is not necessary to carry out siphon drainage of the gastric juice as a recent observer insisted, which had been done previously in an admirable manner by Lim, Matheson and Schlapp. It seems to me that for clinical purposes we need only keep to a rigid and standardized test meal of known composition and bulk. I still believe that every hyper-acid response, if persistent, has some explanation, and a complete survey of the patient will not fail, in most instances, to discover the probable cause.

We have been too prone in medicine to ex-

pect a pathognomonic gastric response to a given disease when we are dealing in terms of gastric physiology. The sooner we realize the extraordinary way in which the normal sequence of digestion can be affected by a multitude of different pathological stimuli, the nearer we will come to a solution of its probable significance. I do not believe that we shall be in a position to know the significance of gastric hyperacidity until we can measure readily the alterations in tonus in that segment of the upper digestive tract comprising the antrum, pylorus and the first part of the duodenum. With the aid of Dr. Thomas we are at present engaged in devising an instrument for graphically recording these changes. The gastro-pyloro-duodenal tube proves, without bringing into play the question of neutral chlorids, that a certain proportion of hyperacidities at least are due to, or rather associated with, an alteration in pyloric tonus. This is in keeping with Bolton's conception, but our experiments so far fail to prove that this is true of all cases. Other factors as yet unascertainable must play a part.

The velocity of gastric secretion even in health and under the influence of various stimuli varies greatly. Apperly quite recently has evolved natural formulae with an estimation at any moment of the total acid, total chlorids and neutral chlorid. The variations encountered, however, scarcely help us in our clinical interpretation. It is to be hoped that the future will clearly demonstrate, first, the exact stimulatory power of each of the different foodstuffs (in a general way we believe we have already solved that problem for the greater part of the human dietary); second, the exact combining power of various foodstuffs, which as yet is not completely known; and, third, the factors which go to make up the resultant gastric response, and this includes the duodenal mechanism as well. When this information is completely available, we should be in a position to classify the types of hyperacidity, and both medicinally and dietetically to control them. We should also be in a position to outline a dietary which is best adapted to handling this problem instead of following an arbitrary system which bears no further acknowledgment than the reputation of its creator.

It is to be hoped, particulary in the treatment of duodenal ulcer, that the dietetic problems involved will be put on a scientific basis rather than on the basis of hypothetical efficiency which exists today. We believe that our present studies are a step in the right direction, and it is devoutly to be hoped that the future will solve these problems.

DISCUSSION (*Abstract*)

Dr. Daniel N. Silverman, New Orleans, La.—The question of duodenal reaction and regurgitation both in normal and hyperacid cases is one for speculation. In determining the reaction or the hydrogen ion concentration of intestinal contents, I have never found free hydrochloric acid in the duodenal contents in normal individuals and have found it in only one instance of hyperacidity. Of course all of this work was controlled by the fluoroscope. I have had occasion to see some of Dr. Boldereff's work at Battle Creek and some of the clinical work that is being carried on on the basis of his neutralization theory.

It is interesting here also to try to explain why we get pancreatic regurgitation into the stomach. In some cases, for instance in chronic appendicitis, we observe an absence of hydrochloric acid in the stomach because in the pancreatic regurgitation the gastric contents are high in chlorid. Sometimes we get a hyperacidity in chronic appendicitis.

The buffer reactions of food are of considerable importance both in experimental and clinical work. Folin, the biochemist at Harvard, has been able in his experimental work to administer large doses of hydrochloric acid by putting with egg albumen as much as a dram or two drams of the acid. Students would not take it ordinarily. Then *in vivo* he found that the egg had liberated the hydrochloric acid and he was able to recover it as free hydrochloric acid.

I have appreciated this discussion from the man who has done more on the question of gastric secretion than any other man in the world.

Dr. A. L. Levin, New Orleans, La.—I would like to ask Dr. Eades what his experience is in cases of duodenal ulcer? Does he expect always to find acid in cases of duodenal ulcer, or has he ever seen cases without acid? Dr. Finsterer, of Vienna, when he was in New Orleans, gave us a wonderful demonstration of resection of ulcer in cases of ulcer. He said that he had seen one or two cases of gastric ulcer where there was absolutely no acid, but he had never seen a duodenal ulcer without acid. We often receive a report from the radiologist of the presence of a duodenal deformity, the history is very suggestive of ulcer, there is a direct relationship of pain to food, which would indicate that there is an ulcer and yet we do not find any acid. I am always skeptical in accepting the radiologist's report when I find an absence of acid, and I always question whether the condition is not due to adhesions of the gall bladder. I have seen recently two such cases in which the exploratory did not reveal an ulcer, but gall bladder adhesions were present.

Dr. J. T. Eads, Philadelphia, Pa.—Of 200 of Rehfuss' cases of duodenal ulcer in a certain series, every one had hyperacidity ranging about 78 per cent. I do not know of any case that I have seen since I have been with him in which there was a lack of hyperacidity in a proven duodenal ulcer. I have seen a lowered acidity, but not an absence.

Dr. Eusterman has reported some cases in the "Medical Clinics of North America," but I have not seen any such cases in my association with Dr. Rehfuss.

CLINICAL EXPERIMENTATION IN DERMATOLOGY*

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It has been customary since the organization of this Section for the Chairman, each year, to consider certain phases of the field of dermatology. In this way the history of dermatology in the South has been reviewed, the place of dermatology in medicine, the limitations of dermatology and the status of the dermatologist have all been discussed. At this annual session, I desire to direct your attention to certain phases of experimental medicine as seen in American dermatology.

Experimental medicine is difficult to divide or classify, but we may for the purpose of this discussion consider it as being composed of, first, set problems which one sees carried out in the research departments of our medical schools, such as the work of Ehrlich in Europe and Schamberg and his co-workers in this Country; second, that type of research which we shall call clinical research, or perhaps better clinical experimentation. There are comparatively few minds in medicine able to produce new ideas or originate analytical research problems. Few are able to conceive the theories from which we may deduce new scientific truths. Many can, however, accurately and scientifically observe and draw conclusions, although they are not able to build up and carry out a problem from analysis.

Sir James McKenzie, who probably has contributed most toward the rational classification and efficient treatment of heart diseases, was a clinical experimentalist. Little has been added to Osler's clinical observations on the erythema group. William Beaumont was simply a clinical observer, and how far-reaching were his clinical researches. Pavloff, who was an analyst, really conceived his experiments from Bernard's observations. To peruse any history of medicine is but to concede that the old paraphrase "there is nothing new in medicine" is almost correct. Indeed, few are the theories in medicine which have not been suggested somewhere in the dim and musty past. Clinical experimentation, then, lends itself largely to proving or disproving the new advances and theories which confront us as medical students.

The skin and its pathological changes lend themselves to study with greater facility and ease than any organ or system. Here we may see grossly, or obtain material for microscopic study for, all pathologic processes, hyperemia, inflammations, neoplastic, hypertrophic, atrophic or infiltrative changes. For this reason there exists, as Pusey[1] has pointed out, a more definite classification and a higher degree of refinement in diagnosis than in any other specialty. We have inherited from early dermatologists, morphologic and clinical classifications, which are sub-divided and re-divided from both gross and microscopic appearance as well as clinical symptoms.

Much of our knowledge has of course come to us from early European observers and it is doubtless to the untiring energy of these indefatigable workers that we are indebted for our fundamental knowledge of skin diseases. It is no wonder, then, with these elaborate studies of skin disease and this extensive knowledge about their eruption characteristics that within the memory of most of us dermatology has assumed a different aspect and the trend of thought in the dermatologic world has been very much broadened.

In the first place dermatologic requirements today demand a thorough and adequate knowledge of all the fields of medicine. The dermatologist must of necessity be an internist and pathologist. It is even more essential, if such a thing is possible, that he be a better trained internist than the internist himself. He must be a bacteriologist, and certainly an immunologist. Biological chemistry has come to play a most important role in our practice. Physiology, embryology, and in fact all fields of biology must be mastered if we hope to be efficient in dermatologic diagnosis and in treatment. Besides having a knowledge of therapeutics, due to the increase in our therapeutic armamentarium, he must also be a physicist. With this broader conception of dermatology it is no wonder that the advancement has been rapid, and much has been contributed by American dermatologists with whom we have some contact. And it is to some of this work which I particularly desire to call your attention, because for us as dermatologists in a new geographic field these may be an aid and stimulus in raising our standards.

Early American dermatology is the history of

*Chairman's Address, Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

these painstaking workers who collected the known facts in skin diseases and by diligent effort gradually developed the specialty until their concepts began to permeate medical minds. These men contributed much, but it has been during the past quarter of a century that the great volume of experimental work has been added to dermatology. To review experimentation in this field in its early American history would require far too much time, but it is wise and fitting that we consider some of the advances in what we may term the present or modern experimental era.

Much of the experimental work done in the past few years has depended upon clinical experimentation to prove or disprove new ideas or theories. Dermatology came to the present generation a well-developed specialty, but in the last decade etiology and rational treatment have made most notable progress.

To mention some of the analytical research upon which our clinical experimentation has been based is to mention the work of most of the outstanding teachers of dermatology today. Among modern American dermatologists there are many illustrious examples of analytical experimentation. Schamberg[2] and his co-workers have furnished that monumental work which has been the basis for much that is new in dermatologic therapy. Fordyce[3] and his associates, in their investigations, have offered a basis for much experimentation. We could enumerate hundreds of men who have contributed to dermatology in the field of experimental medicine. Let us briefly consider some of the work which has been done within the knowledge of most of us in the field of clinical experimentation.

Pusey's[4] pioneer work in x-rays and carbon dioxid therapy offered a basis for much clinical experimentation in dermatologic therapy, which was followed a few years later by the far-reaching and invaluable work of MacKee[5] and his associates. Nothing has had so profound an effect upon dermatologic therapy perhaps as MacKee's experimentations in radium and x-ray therapy. Schamberg has laid the basis for clinical experimentation in many new preparations and has developed a rationale of therapy which has been rapidly taken up by dermatologists over the country, thereby helping him to arrive more quickly at a conclusion as to the value of the new drugs which he has presented.

The clinical work of Udo Wile[6] in certain infectious diseases such as warts, molluscum contagiosum and pityriasis rosea[7] represents the highest type of clinical experimentation and has laid the foundation for much more extensive clinical research. Cole[8] in his clinical studies on the absorption of mercury and his later observations on the therapeutic values of bismuth are examples of clinical research which will rapidly change the aspects of dermatological practice. The work of Castellani[9] and Wiedman[10] in the fungus infections of the skin, the work of Engemann[11] and his associates in amebal infections of the skin, the clinical experimentations of Duke and other allergists are all examples of the modern trend of dermatology towards scientific and accurate observations. Today on every hand valuable experimentation is going on. Michael[12] has studied the blood vessel changes in disease and the effect of diet on acne.

Ayres[13] has shown the effects of sunlight in certain types of cheilitis and the tolerance for glucose in eczema. Foerster[14] has recorded the effects of certain local irritants and Cole and Driver[15] have studied industrial dermatoses. Engmann[16] has observed infectious eczematoid dermatoses, and Ormsby[17] has studied the sensitization element in eczema. Ketron[18] has studied the parasitology of acne and Kirby-Smith[19] and Shelmire[20] the etiology of *Larva migrans*. White[21] has contributed to our knowledge of vesicular dermatoses, while McBride and Dennie[22] have established sodium thiosulphate as a therapeutic agent.

Eller[23] has opened up a new therapeutic field with infra-roentgen rays. These are but a very few examples of the activities in dermatology today. In fact, clinical experimentation to determine etiology or better methods of treatment is going on all over the country. Sensitization, anaphylaxis, metabolism in skin disease, all are being investigated. We Southern dermatologists have the same opportunity for observation as those who are now engaged in this work.

What place has clinical experimentation in dermatology and how does it serve towards dermatologic advancement? Early experimentations and preliminary reports by analytic experimentors are rapidly being proved or disproved by clinical experimentations of dermatologists over the country. In this way valueless things are rapidly discarded and valuable agencies more rapidly come into universal use. Compare the difference in time required to establish arsphenamin and that required to establish the value

of the more recent tryparsamide and gold preparations. This difference is due to the fact that scientific observers are carrying on rational clinical experimentation everywhere.

A few years ago we began to think of biological reactions and now careful studies are being made of the blood and tissues in practically every disease. Clinicians isolated in many instances from the large medical schools and laboratories carry on experimental work which may contribute something of value to our specialty.

Dermatologists must cultivate a scientific attitude. Slip-shod diagnosis and therapy in dermatology are rapidly becoming things of the past. In order to observe accurately and carefully, certain general principles must be followed.

Careful history taking with a complete written record is of first importance. A careful general physical examination and the observations of concomitant diseases is essential. Laboratory work including blood chemistry, kidney function test, metabolism, roentgenographic findings, with an analysis of these findings, which should be accurately recorded, followed by frequent revision of these records, and follow-up and comparison of results of therapeutic agencies. How may we be able to make use of these findings?

A few years ago Engemann and Weiss[24] called our attention to the fact that Von Recklinghausen's disease was often associated with lesions in the bone. This was made possible only by careful examination of the patients for concomitant diseases and careful review of their records. By observing the blood findings, it has been possible to show the influence of diet in skin diseases. Many of our old conceptions such as that of the uric acid diathesis, have been discarded as thorough examination in large series of cases has shown the belief to be a fallacy. Today, the clinical experimentor must study his cases, preserve accurate records, and no longer consider the resolution of a lesion the practice of dermatology. All biologic processes of the body are observed and recorded, new theories and new drugs should be tested and reports of the clinical findings inserted into our literature. Thus, if a very large number of men work on the problem we shall more rapidly be able to accept or discard thories and ideas advanced by our co-workers. If clinical experimentation is to have an influence, the results of our experimentation must be recorded. It has long been a fault of Southern dermatologists that their observations have not been injected into medical literature.

Our limitations in solving constructive experimental problems may be mental, geographic, temperamental, or environmental, but all of us are able to carry on some clinical experimentation and report or review our findings so that they may be of some value to dermatology.

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INTRACRANIAL INJURY DUE TO LABOR: A CLINICAL AND PATHOLOGICAL STUDY*†

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Among the most important of all causes of fetal death is intracranial injury. Injuries sufficient to cause death of the fetus ensue from

*Read in Section on Obstetrics, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

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the action of forces exerted upon the head during the process of labor. These forces of labor may become greater either by natural causes or by external force applied to terminate labor.

The mechanism of the production of intracranial injury has been very well demonstrated by Holland in his comprehensive monograph on the "Causation of Fetal Death." In this work Holland[1] has shown how forces acting on the head produce the injuries sustained. The means by which these forces are brought to bear upon the head is of extreme importance to the clinician in his work in the field of obstetrics in the reduction of fetal mortality.

The structures within the cranial cavity of a fetus near term are so arranged that they will withstand a normal or usual amount of stress produced by the forces acting externally on the head during labor. This arrangement allows the usual degree of molding to take place in the proper length of time, without injury to the structures. When unusual force is applied to the head the structures are subjected to a degree of stress which may be sufficient to cause injury. In such an event the structures involved and the degree of injury would determine the outcome of the case.

In order that we may understand the method by which forces are brought to bear on the head under ordinary conditions we should consider the progress of the head through the pelvis. As the head passes through the pelvis it is subjected to the general compressive force encountered as a result of the expulsive forces of labor pushing the head against the resistance offered by the birth canal. The head is also subjected to compressive forces which are applied at the ends of the long diameter of the head as it enters and passes through the various pelvic straights. These longitudinal compressive forces are those that account for the molding of the head during labor. As a result of these forces the structures in the cranial cavity are subjected to stress.

The position of the head in the pelvis, as well as the size of the head and its relation to the size of the pelvis, are factors that tend to determine the structures subjected to the longitudinal stress encountered. The force to which the head is subjected determines the degree of stress brought to bear on these structures.

The mode of delivery in any given case determines the force exerted to effect delivery. Should that amount of force be excessive, or should the force be applied too suddenly, the resulting stress may cause damage to the structures within the cranial cavity.

In order that one may see the effect of excessive cranial stress it is best to correlate the clinical side of cases in which cranial injury occurred, with the pathological findings in such cases. This investigation has been carried out in the Obstetrical Service of Washington University, where autopsies are performed with the clinical data at hand.

The consideration of structures that would show excessive cranial stress is of considerable importance to those doing obstetrics. In the first place, the external coverings of the head may denote unusual force applied by the appearance of abrasions, contusions, and hematomata. These lesions would denote that a degree of force excessive to the tissues mentioned had been applied.

Second, the cranium itself might show evidence of an excessive force as evidenced by fractures, marked overriding of the bones, or by an excessive degree of molding of the head.

Third, the structures within the cranial cavity subjected to an excessive stress would be expected to show the result of stress by injury. These injuries, if extensive enough, would be sufficient to cause death.

Pressure applied to the brain substance by external forces acting upon the head may be sufficient to cause laceration, contusion or concussion to a fatal extent. Unless visible evidence is apparent in the brain substance such injury is extremely difficult to detect and may not be demonstrated.

Visible evidence of excessive stress may be demonstrated in the septa of the dura mater, where lacerations are quite evident.

The frequency with which the lacerations occur at certain portions of the dura mater septa can be explained by demonstration of changes in shape of the fetal head during the process of molding. When the antero-posterior diameters of the head are shortened by pressure applied to the opposite ends of these diameters, the vault of the cranium is elevated. Attached to the cranial bones which move upward in this process is the falx cerebri. This structure in its central portion becomes tense and tends to draw upward with it the tentorium cerebelli, which becomes increasingly tense along its anterior borders at the region of its junction with the falx. When the tension becomes too great, lacerations will occur, which are usually located in the tentorium just below its junction with

the falx. This type of laceration is most common to the occipital presentation in which excessive force has been applied to effect delivery.

In the presentation in which the shape of the head is changed by lengthening of the antero-posterior diameters, due to forces acting on the ends of the vertical diameters of the head, the lower border of the falx and the free borders of the tentorium will become tense. This is the result of the increase in the horizontal diameters, due to the posterior displacement of the occipital bone as the cranial vault is pressed toward the base. Here again tears may result in the free margins of the tentorium or in the falx, toward the lower margin, in the posterior portion.

The latter type of molding of the head would occur in mental, brow, and sincipital presentations. A combination of these two types of alteration of the shape of the head may occur in parietal presentations, or in cases where rotation of the head progresses with difficulty.

The dura mater septa are so arranged that during labor they effect a protective mechanism for the brain substance and its vessels. During the process of labor the septa take stress that would otherwise be exerted against the brain substance or taken by the vessels. In order that the stress may be better borne by the septa, reinforcing bands of dense fibrous tissue are distributed through them in the lines of the greatest stress. It will be seen that these bands are distributed throughout the portions in which tears would produce a great degree of damage to cranial contents.

Holland has worked out two systems of "these strengthening bands:" the "antero-posterior system" and the "vertical system." These systems take their names from the main direction of the stress lines along which they lie.

Lacerations of the septa alone do not in themselves account for fetal death. Such lacerations are indicative of an excessive degree of cranial stress, which may have been exerted against the brain substance, causing interference with vital impulses and subsequent death.

In intracranial injury, damage to blood vessels with subsequent hemorrhage is of extreme importance. The large vessels are, for the most part, protected by the layers of the dura. About these vessels the fibers of the dura are protectively arranged. When the lacerations of the dural septa occur the vessels may be torn and hemorrhage may ensue. A potential source of hemorrhage in all cases is the vein of Galen, or the great cerebral vein, and its tributaries. For a distance these vessels are unprotected by the dural septa. When the vertical diameters of the head are increased, the straight sinus moves upward and the tributary veins are stretched, as well as being kinked by the acute angle thus formed. Under such conditions the veins become congested and may rupture.

Hemorrhage within the cranial cavity may cause death by interference with cerebral function. In addition to this, the hemorrhage may be severe enough to dangerously deplete the blood volume of the child. Any amount of hemorrhage in the cranial cavity may be considered detrimental.

In order to make a study of the actual occurrence of intracranial injuries autopsies are obtained on all possible cases where the death occurred between the twenty-eighth week of intra-uterine life and while the child was in the hospital. On the out-patient service autopsies are done only when the complete release of the body is obtained. In almost all hospital cases a complete release of the body is obtained.

An autopsy is done and the head is preserved by injection of 10 per cent formalin through small openings cut in the dura. The head is kept in formalin for a sufficient length of time to allow hardening. It is then opened by the Beneke method and the cerebral hemispheres are removed separately. This method allows examination of the anterior and middle fossa for hemorrhage and laceration. The surface of the cerebellum may be viewed from above. If desired, a portion of the occipital bone may be removed and the cerebellum examined and removed from below.

Should one wish to preserve the head it may be immersed in a solution of equal parts of phenol, glycerin and alcohol for a few weeks, after which it will keep indefinitely. Glass rods may be inserted between the cranial vault and the floor to prevent distortion from shrinkage.

Heads preserved in this manner make excellent material for demonstration and for teaching purposes.

Our material for study consists of observations from 178 autopsies over a five-year period. In no case was the fetus of less than twenty-eight weeks' gestation, as it is the custom to study the fetus of earlier gestation in the laboratory.

Out of a total of 178 autopsies, 63 cases showed definite cranial injuries (35.3 plus per

cent). Of the total number of autopsies, 32 of the fetuses showed marked maceration which would preclude the possibility of recent cranial injury. In the remaining 146 cases the percentage of cranial injuries was 43.1 plus.

Taking up the nature of cranial injury, it is seen that six of the cases showed injury to the external tissues of the head and to the cranial box. One of these six had also a marked intracranial hemorrhage.

These cases include: two fractures, one craniotomy wound, one of extreme molding and overriding of the cranial bones, one marked cephalhematoma with intracranial hemorrhage, and one with marked distortion and contusion of the face as a result of face presentation.

Turning now to the 58 cases with definite intracranial injury, our findings are as follows:

Eight were cases the clinical records of which showed that death occurred long before the injury was sustained.

The remaining 50 cases had suffered intracranial injury while the children were still viable.

Four cases included lacerations without hemorrhage. In each instance the laceration involved one side of the tentorium.

Forty-six cases showed definite intracranial hemorrhage with or without lacerations of the dura.

One case included hemorrhage produced by veni-puncture, after birth.

Fifteen of the hemorrhagic cases showed no evident dural lacerations. Ten of them had as the source of bleeding or extravasation the cerebral veins, while two showed marked extravasation between the layers of the falx, and three included the layers of the tentorium.

Thirty-one times autopsy revealed hemorrhage and lacerations together.

Twenty of these involved tentorial tears, while ten included both tears of tentorium and falx, and in one instance the falx alone was torn.

The clinical causes of death by cranial injury cannot always be ascribed to any one particular condition. Many times a complication of labor, threatening the life of the child or the mother, may call for a delivery procedure which would predispose toward cranial injury. Thus two or more factors may be present, any one of which produce a cranial injury.

In order to analyze the cause of injury in this series, cases have been grouped according to the most logical primary cause, as has been ascertained by study of the course of the labor. Where important complications made intervention necessary, such complications were noted.

In the eight fetuses dead *in utero* some time before delivery, degenerative changes were shown. The degeneration had progressed to a degree sufficient to account for the lacerations produced, while the head was subjected to the stress of ordinary delivery.

In the cases in which lesions were demonstrated in definitely premature infants the degree of prematurity can be considered as the most important factor. Here the more delicate cranial structures may not be sufficiently strong to withstand the stress encountered when the forces of labor cause the head to be applied to the resistant perineum, and lacerations will result. There were sixteen cases in the series in which the children were premature. None of these infants weighed over 2,400 grams. In all these cases delivery was spontaneous. Nine of these were still births. The others lived for periods varying from one hour to five days. In two of these autopsies syphilis was diagnosed, and one of the infants showed congenital anomalies.

Case Illustrating Injury to Premature Head Due to Resistance Offered by Pelvic Floor, O. P. D. 6274.—The mother was colored, gravida two, with one previous labor at term, with which she had had no trouble.

The mother's floor was firm, outlet slightly contracted, and she had prominent spines. Labor started at about 32-34 weeks. She was in very easy labor for six hours with second stage 1:20 minutes. Delivery was spontaneous. The child weighed 1,550 grams. Artificial resuscitation was necessary. The child lived one and a fourth hours.

Autopsy 2285.—The head showed blood clots along the falx and hemorrhage into the falx. This head did not have to mold on account of its small size, but enough pressure was exerted to cause injury, as was evidenced by the hemorrhage.

Where the fetus is definitely post-mature there may result in labor and delivery injuries to the head resulting from unusual forces. The head of the post-mature fetus is frequently much larger than that of the fetus born at term. This results in a greater degree of force working against the head both from the forces of the contractions and from the resistance encountered.

Under conditions of much pressure the normal head not only undergoes molding, but also submits to reduction in size brought about by the overriding of the cranial bones at the sutures. This mechanism tends to shorten various diameters and diminish the tension on the septa.

In the post-mature fetus, overriding is not

so marked or not so easily carried out. Here the tissues are much more firm than the normal. The sutures are smaller and much more fibrous so that any overriding is minimized. The cranial bones are usually more ossified. All of these factors tend to produce an extreme degree of molding of the head which causes increased cranial stress.

Case of Post-Maturity in Which Injury Was Sustained Probably as a Result of Inability of Large Head to Mold Easily.—The mother was gravida one, and due from the history August 7. The pelvis was normal and floor very firm. The onset of labor was August 21. Labor lasted thirteen hours. The second stage was three and a half hours. The fetal heart beat was not heard some time before delivery. Delivery was by perineal forceps. The child was still born, weighing 4,620 grams.

Autopsy 2233.—There was a large head with small fontanelles. The cranial bones were very hard. There was no free movement, little molding, and no overriding.

Subdural hemorrhage showed over both hemispheres and into the posterior fossa.

There was an anterior tear of the tentorium on the right. On the left there were several tears of the posterior leaf near the center of the membrane.

Six cases in the series were diagnosed as postmature. In all of these cases the weight of the child was over 4,000 grams and a history of post-maturity was obtained. The largest child weighed 4,615 grams. Three were still born and three survived birth for a short time. All of the labors were long and five were terminated by difficult forceps deliveries. One case had a contracted pelvis.

Where a relative disproportion exists between the size of the head and the size of the pelvis, unusual forces must be exerted to effect delivery. Usually when allowed to progress normally these labors require a considerable length of time, during which they are subjected to a total amount of force much greater than in the normal case. To permit the passage of the head in these cases there is an excessive degree of molding of the head which tends to increase certain diameters beyond their normal limits.

In protracted cases it may be necessary for the obstetrician to intervene in order that delivery may be effected. Such deliveries usually require an extreme degree of traction, which is another method of applying force. These factors would make for the production of intracranial injuries.

Two of our series showed injuries sustained in labors complicated by contracted pelvis. The children were of normal size. Both labors were long, and were terminated by forceps delivery without much difficulty.

Difficulty of delivery may be encountered in forceps delivery where the position of the head in the pelvis may make for unusual applications. The head may be in such a position that in order to effect progress excessive force is used in producing descent or rotation. In these cases the skill of the operator may in a large measure determine the force to which the head is subjected. Due to improper lines of traction or the improper method of rotation injuries may be sustained.

Of the injuries in the series, nine were in the above mentioned type of case. Five of the applications were made to terminate labor in arrested occiput posteriors, with long labors. One case was that of a high forceps delivery in a posterior parietal presentation after labor had progressed for a long time. One case was delivered by high forceps because of a severe toxemia of the mother. The others were low forceps deliveries terminating long labors.

Case to Illustrate Type of Injury to Head in Case of Difficult Forceps Delivery, B. H. O. 4913.—The mother was at term. Labor was started easily with castor oil and infundin. The pelvis was normal, the occipito-dextro-posterior position.

Labor was very slow. After twenty-five hours, delivery was made by double application of forceps with the head about the level of the spines. Difficult application was observed with considerable traction for delivery.

The child was still born, weighing 3,500 grams.

Autopsy 2207.—The head showed evidence of trauma, with marked molding. A hematoma of the scalp was present. There was blood in the subcutaneous tissue, laceration of the temporal muscle, and fracture of the left temporal bone.

There was blood in both sides of the cranial cavity over the hemisphere and much blood in the subtentorial region of the posterior fossa. Lacerations of the tentorium were seen on both sides.

A number of observers have already pointed out that intracranial injury is a frequent occurrence in breech deliveries. Richard N. Pierson,[2] in 1922, presented a very comprehensive study on the pathology of injuries in breech cases. In this work he points out the frequency of cranial and spinal injuries in breech deliveries.

The frequency of cranial injury in breech cases seems to be the result of two factors introduced into the process of breech extraction. These are, namely, the excessive force used to effect the delivery of the head, and the too sudden molding of the head as it passes through the pelvis.

Case to Illustrate Intracranial Injury as a Result of Unusual Force Necessary to Deliver a Breech.—The mother was a gravida 11. All had been normal labors. The pelvis was normal. Labor occurred at term with

face presentation. Labor was very easy but long, seventeen hours. The second stage was five and three-quarter hours. Version and breech extraction were used. Much difficulty was experienced with extraction because of the extended arms. Excessive pressure and traction were used to effect delivery. Weight of the child was 3,950 grams.

Autopsy 2255.—There was swelling over the left parietal bone, and there were small hematomata over the frontal and occipital bones.

There was a laceration of the falx 9 cm. long and laceration of the tentorium on the anterior surface of the left side, with hemorrhage into the cranial cavity.

Case to Illustrate Extreme Molding of Head with Breech Extraction Through Simple Flat Pelvis, O. P. S. 6265.—The mother was gravida 1. It was a frank breech, with left sinciput anterior. The pelvis was simple and flat. Easy labor lasted sixteen and a half hours. The fetal heart beat was good throughout labor. The second stage lasted only one and a half hours. Breech extraction was accomplished without much trouble. The child's weight was six and a half pounds, or 3,190 grams. Artificial resuscitation was necessary. The child lived seven hours, with evidence of intracranial injury.

Autopsy 2282.—There was marked intracranial hemorrhage over both cerebral hemispheres down along both sides of the falx and beneath the hemispheres; hemorrhage into the posterior fossa; and a large laceration of the falx cerebri, 3 cm. in diameter.

Holland, Carothers,[3] Ruge[4] and many others have called attention to the important point of the frequency of cranial injuries in the breech delivery. Our series certainly bears this out. No less than 13 of the series occurred in cases delivered by the breech.

Ten of these were extraction after breech presentation. Of these, three were definitely premature. Other complications were: there was one contracted pelvis, one hemorrhagic disease of the new born, one toxemia of pregnancy, and one fetus was syphilitic.

The other three breech cases were delivered after versions. These versions were done in two cases because of prolapsed cord, and in the other case because of transverse presentation.

Of the 13 breech cases seven were still births. The others terminated in death soon after delivery. Only one child lived as long as the fifth day of life.

In the series, three cases of intracranial injury occurred in children born by normal easy labors at term. Two of these cases showed definite lacerations of the septa, which would indicate excessive stress. The other showed hemorrhage without laceration and suggested asphyxia. It is probable that in any series of cases showing cranial abnormality a few cases will occur that cannot be explained on the basis of any clinical condition. It is also probable that in the series here analyzed, other causes may have produced death, while the intracranial injuries were only contributary or incidental.

At a recent meeting where obstetricians and pediatricians discussed the treatment of intracranial injuries, it was universally conceded that the treatment for these injuries was mainly prophylactic. Once the injury was sustained there was little to be done in the hope of saving the life of the child.

The prophylactic treatment evolves mainly upon the obstetrician. Bearing this in mind and considering the types of cases in which intracranial injuries are common, one may see how the number of cases of injury may be minimized.

Accurate pelvimetry as a part of routine prenatal care will in most instances reveal pelvic disproportions. This forehand knowledge will enable the obstetrician to procure a course of management of labor in the interests of both mother and child.

In cases of arrest of the head in the birth canal where prolonged labors or slow progress makes for a bad prognosis for the fetus, skillful intervention on the part of the obstetrician will reduce the fetal mortality. An accurate knowledge of the technic of forceps application and delivery will do much to simplify this type of delivery and to reduce fetal death through intracranial injury.

In a recent contribution by Heidler[5] concerning early mortality in the newborn, the author urges more active intervention in the interest of the child. In protracted labors it is frequently possible to shorten the duration of labor by forceps delivery. This procedure may be carried out in suitable cases with much less trauma to the head than the trauma experienced by al-

CHART I

TOTAL NUMBER OF AUTOPSIES OVER FIVE-YEAR PERIOD 178

63 cases of definite cranial injury.
61 cases of injury outside of cranial cavity.
58 cases of intracranial injury.
8 cases in which death occurred before injury.
50 cases of true intracranial injury.
4 cases of lacerations without hemorrhage, all unilateral.
46 cases involving hemorrhage.
1 case produced by puncture after delivery.
45 cases involving birth hemorrhage.
15 cases hemorrhage without laceration.
10 involved cerebral veins.
2 involved layers of the falx.
3 involved layers of tentorium.
31 cases of hemorrhage and laceration together.
20 involved tentorial laceration.
10 involved both tentorium and falx.
1 involved falx alone.

lowing delivery to take place spontaneously over a much longer period of time.

For the past six years, on the ward service, it has been almost a routine procedure to terminate labor in the primiparae by episiotomy and perineal forceps delivery. This procedure, we feel, is done both in the interest of the mother and child. In these normal cases when a segment of the head, about 5 cm. in diameter or more, distends the vulva, the perineum is ironed out by manual dilatation, forceps are applied, an episiotomy is done, and the head is gently lifted over the perineum. In this manner the heads are saved from the very forceful effects of the final labor pains which would act over a longer period of time to effect spontaneous delivery. The method also protects the perineum from over-distention or uncontrollable lacerations.

From the results in the premature cases it would also appear that the method of delivery by forceps would have its merits where the delicate head of the premature infant was being forced against the resistance of the pelvic floor.

When labor progresses too rapidly the head is more or less suddenly forced against the resistance of the birth canal. This forceful and rapid progress does not give sufficient time for the compensatory process of molding to take place. Consequently lacerations may result, when under the normal forces of labor acting over the normal period of time, no injury would have occurred.

The administration of excessive doses of pituitary preparations in labor would tend to produce conditions predisposing to this type of lesion.

Bearing in mind the frequent evidence of cranial injuries in the post-mature fetus, the obstetrician should give due consideration to the management of labor in these cases. Where pelvic contractions exist or a disproportion of the head is expected in a post-mature case, the question of labor or cesarean section should be given serious thought.

It is a fact that many more autopsies on children delivered by breech show signs of intracranial injury than signs of asphyxia. This indicates that most breech deliveries are done rapidly enough. If anything they are done too rapidly. In order to shorten time too much force is used in breech extraction, and too frequently injuries are sustained. The technic of version and breech extraction as advocated by Irving Potter[6] will do much to reduce death and injury in breech deliveries.

In this method the time factor is not the primary consideration, but a delivery by skillful manipulation rather than by forcible extrusion accomplishes safer breech extractions.

When the various points here considered, together with special consideration of individual cases, are correlated in the prophylactic treatment of intracranial injury, then will the incidence of these injuries decrease toward a minimum. This minimum will be approached as better obstetrics advances.

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DISCUSSION (*Abstract*)

Dr. M. Pierce Rucker, Richmond, Va.—I know of no question in obstetrics more important than this one of intracranial injury. Undoubtedly mechanical injury is important, but it is not an all-important factor. There is not a perfect correlation between the stress of delivery and the incidence of intracranial injury. All of us have seen poorly executed forceps deliveries with no clinical evidence of intracranial hemorrhage, and on the other hand you find very easy deliveries with intracranial damage. Siegert reported in the *Zentralblat fur Gynalologie* of last year a case of placenta previa brought into the hospital after hemorrhage, immediate cesarean section, the baby dying on the fourth day with symptoms of heart disease, yet autopsy showed a bilateral tentorial tear. I have read somewhere that Dr. Osler performed an autopsy on a patient dying in pregnancy of typhoid fever, the findings showing massive hemorrhage of the lateral ventricle. I have had one case of hydramnion in which the baby was literally washed into the world by the rush of amniotic fluid, when the membranes were ruptured. At autopsy we found the baby had a bilateral tear of the tentorium. So stress is not entirely responsible. If it were we could prevent these cases.

The importance of blood dyscrasia and hemorrhagic disease of the new-born is variously estimated in different clinics. Some emphasize it a great deal and some not so much. The question of unequal pressure on the baby when the head presents, the head outside the uterus and the baby's body subjected to tremendous intra-uterine pressure, is stressed by the Germans. Another factor that has not been mentioned which I believe is important is the rapid decrease of pressure that occurs in precipitate labor or in quickly executed cesarean section. You have the baby under pressure in the second stage of labor. Suddenly the pressure is relieved and expansile force is exerted on the head. Then there are certain groups that are especially subject to intracranial hemorrhage: the premature group, those that require breech extraction, the cyanotic group and those that are delivered with pituitrin.

You find various grades of symptoms from the pallid, limp baby that resists all efforts at resuscitation, al-

though the heart continues to beat for some time, to the baby who is at birth apparently normal. Sometimes they can be resuscitated only after lumbar puncture. Unfortunately, the benefit is not usually permanent, but occasionally one will survive. Riviere has reported seven cases of severe intracranial injury in which resuscitation was ineffectual until lumbar puncture was done, and these babies survived. At the end of a year only one showed any injury to the brain, and that one had syphilitic parents.

The next grade is the babies that probably require a little resuscitation at birth, but who do not do well. They have a peculiar cry, they will not nurse, they lie in a rather apathetic condition, and very often they will have an elevation of temperature on the second or third day. In that group of cases you can do a great deal of good by following the Monroe treatment of repeating the lumbar puncture until you get a decompression.

Then we have to bear in mind the baby that does not do very well the first week of life for no apparent reason. In such cases we should exclude intracranial injury carefully.

The treatment is not so hopeless as we used to think. After the primary shock is over, repeated lumbar puncture, or cistern puncture, will do much good and many will be cured with no signs of cerebral damage persisting.

Dr. Thomas B. Sellers, New Orleans, La.—It has been proven conclusively that low forceps, intelligently applied, and episiotomy have lowered the incidence of intracranial hemorrhage. I agree with Dr. Rucker in regard to lumbar puncture. At the Baptist Hospital we keep a needle sterilized and ready for use. This is very important, as the time taken to sterilize the needle is likely to cost the baby's life.

Dr. Paddock (closing).—There are several classes of cases in which these injuries occur: the case of postmature fetus, the case of difficult delivery due to abnormalities, the case of relative disproportion between the head and the pelvis, the breech extraction case and the case of precipitate delivery, sometimes brought on by the use of pituitary substance. We have all seen those cases where excessive force has been applied, where we thought the baby would have absolutely no chance, and yet the baby came out crying spontaneously and apparently perfectly well in spite of the marked abrasion on the face. In those cases I think it means that the resistance of the fetus, that is, the physical resistance of the structures of the head, was sufficient to overcome the excessive force applied incorrectly.

In regard to the treatment, I did not mention that, because we leave that to the pediatric service. As soon as a child is born we turn it over to the pediatrician. We have a resident pediatrician and he comes into these cases with us. They do resort to lumbar puncture and cisterna puncture frequently, doing as much as they can to relieve the tension and massive exudate.

It has been our custom in ward cases for five or six years, where the head is on the pelvic floor, to do an episiotomy, dilate the perineum manually and lift the head with perineal forceps. Since we have been following that method, the number of intracranial injuries has decreased almost to nothing. Practically all of our primiparae are delivered by the low perineal forceps and episiotomy.

FACTORS DETERMINING THE END-RESULTS OF THYROIDECTOMY FOR HYPERTHYROIDISM*

By G. W. Crile, M.D.,
Cleveland, Ohio.

An accurate estimate of the operability of the patient, that is, whether or not at a given time a given patient has reached his safest operative moment, or in other words, the ability to decide whether delay or action is the best procedure; a permanent organization of the hospital, medical, and nursing staff, with mobile operating units which make easy the performance of operations in any room, with the patient undisturbed in his bed; the prevention of fear, worry and anxiety; the preoperative use of iodin; the assurance of an adequate water-intake to maintain the optimum water balance; the avoidance of ether anesthesia and the priceless service of an anesthetist skilled in maintaining in the patient a contented, even, happy frame of mind under nitrous oxid-oxygen analgesia; safe judgment as to how far to venture at a given moment, to ligation, to lobectomy, or to bilateral partial thyroidectomy; the maintenance of tranquillity during the operation; complete flexibility in the operative approach, in the extent of the operation, and in the final disposition of the wound, whether it shall be temporarily left open, closed with drainage, or closed without drainage; an operative technic so planned that the operation can be stopped abruptly at any point; the prompt use of blood transfusion; the support of a failing myocardium by digitalization; postoperative care by skillful nurses who have developed a special understanding of the peculiar needs of these volatile patients; accurate judgment and prompt action on the part of the resident surgical staff, each member of which is himself trained and able to perform successfully every type of operation on the thyroid gland: these requisites have so minimized the mortality rate of operations on the thyroid gland that death, when it does occur, is due to secondary causes such as sudden heart failure, hemiplegia, uremia in cases of diabetes of long standing, and occasionally to pneumonia or pulmonary embolism.

Under the favorable conditions listed above,

*Read in Section on Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

the mortality from lobectomy or from bilateral partial thyroidectomy is no higher, perhaps in extreme cases even not so high as that incident to the transportation of these highly excitable patients to the hospital. A ligation performed in a few minutes without moving the patient from his bed and without mental disturbance causes even less reaction than the admission of the patient to the hospital. The second ligation, performed the second day after the first, is followed by a still slighter reaction; and the marked improvement which results from the ligations makes the reaction following lobectomy in the stabilized patient no more severe than that following ligation in the frail, excitable, emaciated patient.

The decision whether a bilateral thyroidectomy or a single lobectomy should be performed depends entirely upon the condition of the patient. If the patient has been sufficiently stabilized by the preoperative management, then in many cases a bilateral thyroidectomy may be performed with no more risk than attends ligation or even admission to the hospital in the case of a sicker patient.

The surgical team, like a football team, has many plays which it can execute to meet the many and often swiftly changing indications presented by the patient. There are certain fundamental principles in accordance with which each play is planned, but there are no fixed rules for their application except one: in case of doubt the play is deferred.

As to the operation itself, there are two main points to be considered:

(1) How much thyroid tissue should be left to assure adequate function and at the same time to prevent a recurrence of the disease?

(2) How can enough tissue be removed to insure a permanent cure without injurying the parathyroids and the recurrent nerves?

These two points will be discussed in the light of our experiences in 18,481 operations on the thyroid gland, and of our findings in a review of the case histories of 5,000 patients.

(1) How much thyroid tissue should be left? From the standpoint of end-results, the surgical team must steer a difficult course between the Scylla of myxedema and the Charybdis of failure to cure the disease.

The most permanently satisfactory results are secured in the cases in which such an amount of thyroid tissue is removed as to produce a temporary, mild hypothyroidism which is characterized by a large gain in weight, a slight feeling of coldness in the extremities, some dryness of the skin, and subnormal reaction to ordinary excitations, that is, the condition which is associated with a slightly subnormal basal rate. These patients usually pass through a definite cycle, progressively increasing in weight for from four to six months, then gradually losing in weight until the pre-goiter normal is regained. All the psychical and physical processes participate in this cycle. It is during this stage of "over-cure" that the internal, fundamental reconstruction takes place which leads to a permanent cure. Only occasionally is it necessary or indeed wise to give thyroid extract, and when such medication is indicated, it should be given intermittently.

On the other hand, the patient who after the operation still has even a slight residuum of the symptoms of hyperthyroidism is likely to grow worse, not better; that is, his course is just the opposite of that of the patient in whom mild myxedema develops.

In our earlier experience, our anxiety to assure the safety of the parathyroids and the laryngeal nerves led us to leave too much thyroid tissue in too many cases. How shall the right amount be determined? It depends entirely upon the indications in the individual case. No treatment that does not include a comprehensive consideration of every factor can be adequate. For example, the amount which must be left in an aged patient with a colloid adenoma would be enough to reproduce the whole disease in a young patient with a hyperplastic gland.

When hyperthyroidism is associated with a unilateral adenoma in a patient of any age, old or young, it is safest to perform a bilateral partial thyroidectomy. In some of my own cases in which I left untouched the apparently unaffected lobe because I thought it was normal and quiescent, after a number of years there developed a large goiter, and in these cases not only was there a new goiter, but there was also a new hyperthyroidism. Another reason for resecting the apparently normal lobe is that, until it is actually exposed to view, its size cannot be exactly ascertained. More than once I have been on the point of leaving such an apparently innocent lobe, but on further investigation have found a surprisingly big mass of thyroid tissue tucked away, as if for purpose of trickery, in

the deep recesses of the neck. The lobe in ambush is often larger than the lobe in the open!

The amount of thyroid tissue which should be left depends also upon the aggressiveness of the disease. In the case of a goiter whose drive against the organism of its victim gains momentum slowly, running a steady course without violent fluctuations over a period of several years, much less of the gland need be removed than in the case of a goiter which runs a stormy, acute course with violent fluctuations in its severity.

The amount of tissue to be left depends not only on the age of the patient, and on the duration and intensity of the disease, but it depends also upon the temperament of the patient, upon his economic and social status, and upon his psychic environment. In the case of a temperamental young married woman with a faithless husband, a sickly child, insufficient income, a quarreling family, and infected tonsils, hyperthyroidism may continue in the presence of a very small amount of thyroid tissue. Such a case is not safely cured unless all of the gland that can safely be removed without laying bare the recurrent nerves or damaging or excising the parathyroids is removed. Such a temperament, when aggravated by embitterment, fears, worries, anxiety and despair, will cause almost any fragment of thyroid tissue to grow to a formidable size. On the other hand, an unexpected outcome of thyroidectomy is sometimes observed in such a case as we have been describing: following the operation the patient's physical and mental condition is immediately and greatly improved, and the tranquillity and sound judgment, which supplant the former abnormal irritability, bring about a readjustment of the very difficulties which either caused or aggravated the disease.

Protection of the Recurrent Nerves and Parathyroids in Thyroidectomy.—In the case of a simple goiter or of a colloid adenoma, the preservation of the nerves and of the parathyroid bodies is simple and easy. But in the case of a hyperplastic gland which is as vascular as a nevus, adherent to the surrounding tissues, and as soft as cheese, the patient feeble and time important, a case in which, unless the pound of flesh is completely removed the patient will not be cured, and these are common cases, we have our real problem.

The first requisite is a free exposure of the gland by a long vertical incision, from the upper larynx to the sternum, the lower part of the incision being made with a forefinger slipped behind the ribbon muscles so as to protect the vessels on the surface of the goiter and the veins in the lower neck. If the long vertical incision does not give enough exposure, then a transverse incision must be added.

If both lobes are of about the same size, adherent and set deeply in the lateral aspect of the neck, the mode of attack is by a vertical division of the gland in the midline, carrying the division not to the wall of the larynx and trachea, but stopping just short of the rings and the laryngeal box, that is, passing just through the thyroid tissue and no further. Then, with thin accurate hemostats without barbs or hooks at the end, held at the very margin of the thyroid, its attachments to the trachea and larynx are caught and divided point by point, until the attachments to the trachea and to the larynx are entirely divided, the division including the attachments of both the upper and lower pole. As soon as opportunity offers, the superior and the inferior thyroid arteries are picked up and divided. The gland is now free to be lifted gently and little by little from its position deep in the neck, each resisting point being caught with the slender blades of the forceps until the outer margin of the gland comes into the range of operation, when the hemostats are attached to the outer margin. Always, from the beginning to the end of the operation, the point of each hemostat is directed inside the capsule of the gland. When the dissection is completed, there will be left on the surface of the trachea and on the surface of the larynx a thin film of thyroid tissue and of connective tissue, and at the outer margin of the thyroid there will be left a thin margin of thyroid tissue.

By this technic the recurrent nerves will not be exposed to view nor subjected to trauma, not even by direct pulling. As the patient is under analgesia and can talk throughout the operation, the surgeon is made all too clearly aware if there should be any transgression against the nerve by either direct or indirect injury. After one lobe is excised, the hemostats are tied off. The bed of the final wound, looking like Topsy's head, will show many small buds of thyroid tissue at the point of the ties. It may be argued at first thought that ligature of these small masses of thyroid tissue is not so good a procedure as the ligature of the blood vessels singly, but a moment's consideration will show the

advantage of tying these small masses. To search out single vessels leads to many accidents because of the fragility of the vessels, thus their precise position becomes obscured with blood, and the securing of a vessel thus hidden in bloody obscurity in close proximity to the recurrent nerve is in itself a hazard. It is a safer and easier method to catch many vessels in a safe zone within which the danger of retraction or mischance is limited. Moreover, the tying of the small masses quite certainly leads to the destruction of the tissue included in the ligation. Some of these knobs of tissue are clipped off, but the majority remain as they are tied.

Finally, the functional integrity of the nerve and even of the parathyroid bodies depends on their safety, not only from trauma but also from swelling, edema and retraction, and a small margin of thyroid tissue, with its capsule covering the nerve and the parathyroids, is the best possible protection against these dangers.

By the application of the method of management and of the technic described above, the operative mortality of thyroidectomy for hyperthyroidism has been progressively reduced. At present we have just passed 500 operations without a death. Postoperative crises also have practically been abolished, and the occurrence of tetany and of disturbances of the laryngeal nerve have been reduced to a minimum.

But the end-results of thyroidectomy depend not only upon the management of the patient during the operation and throughout his stay in the hospital, but also upon a prolonged period of adherence to a meticulously planned regimen of life. If the patient after a satisfactory progress in the hospital returns to irritating home conditions, to an ill-advised diet, to heavy, anxious work, to limited hours of sleep and rest, then the cure cannot be established and the patient, under such conditions, will probably return to the hospital later or will suffer at home from a recurrence of the disease.

Another factor which may produce a recurrence, or may hinder convalescence and lead to a recurrence of the disease, is infection. It is of the utmost importance that the surgeon be assured that the patient is harboring no focus of infection. Sinuses, tonsils and teeth should be examined and any focus of infection should be removed.

What may be accomplished by meticulous adherence to a carefully planned hospital, operative and postoperative regimen is indicated by the following figures gained from a study of the end-results in a typical, unselected series of 1,244 cases of hyperthyroidism. Ninety-eight per cent of the patients in this series were reported to be in fair, good, or excellent condition for periods of from a few months to many years after operation. We now have available for study 18,481 operations on the thyroid gland, of which 13,222 have been thyroidectomies and 5,259 have been ligations, and 9,585 of the thyroidectomies have been performed for hyperthyroidism. A comparative study of the end-results in this series is now in progress.

Experimental and clinical studies have been in progress for some years to determine the underlying factors in the production of hyperthyroidism. Among the most interesting and significant observations in these studies have been the following: (1) that the symptoms of hyperthyroidism and the symptoms of adrenalism are the same, that is, both adrenalism and hyperthyroidism cause increased heart action and increased pulse pressure, dilatation of the vessels of the skin and sweating, dilatation of the pupils, increased metabolism, hyperglycemia, gastro-intestinal disturbances, and nerve activation. Clinically it has long been known that the injection of adrenalin in a patient with hyperthyroidism produces an exaggeration of the symptoms of hyperthyroidism. This clinical observation has been confirmed by experimental evidence. Moreover, our experimental studies indicate that this correlation of clinical phenomena is due to an antithesis of function. The function of the thyroid gland is a building-up or changing mechanism; that of the adrenals is a discharge mechanism.

These data and other data which might be cited are exceedingly significant, for they disclose that the chief, probably the only causes of thyroid crises, are those factors which cause an increased output of adrenalin. These factors are the following: pain, emotional excitation, foreign proteins, auto-intoxication, wound secretion, focal infection, infectious diseases, asphyxia, inhalation anesthesia, hemorrhage, the injection of adrenalin. These are the only factors that can precipitate a thyroid crisis. Each causes an increased output of adrenalin. It follows that any plan of hospital and operative management and any postoperative regimen whereby these factors can be avoided must have a direct influence upon, must promote both the immediate and the remote results of thyroidectomy for hyperthyroidism.

HYPOTHYROIDISM OF ADULTS*

By A. B. CRADDOCK, M.D.,
Asheville, N. C.

There is a present tendency to ascribe all sorts of conditions to endocrin disturbances and to use "shot-gun" gland preparations to treat everything from dandruff to ingrown toe nails. However, it is generally believed that there is an interglandular association of the whole endocrin system, and Hammett has recently shown a definite thyroid-adrenal and ovary-adrenal relationship. We have only scratched the surface of the endocrins. We know a few things about the thyroid, less about the pituitary and still less about the others. There are conditions of hyper- and hypo-functions but according to Asher these are largely artificial conceptions. Certainly signs of both states may be present at the same time.

In 1873, Sir William Gull described a condition which was called Gull's disease. Later Ord gave it the name of myxedema on account of the mucus-like material found in the subcutaneous tissues. Also Kocher found that a similar condition developed after complete removal of the thyroid gland. In 1888, the Commission of the Clinical Society of London found that cretinism, myxedema and cachexia strumipriva were the same, and that the condition was due to loss of the physiological function of the thyroid gland. Four years later Murray and Howitz found that the administration of the gland by mouth would relieve the symptoms of insufficiency.

The most notable contribution following this was the isolation of thyroxin, the active principle of the gland, by Kendall in 1915.

We have been given much excellent work on the subject of the thyroid, but most of the papers have concerned hyperthyroidism and its operative treatment. The surgeons have been more assiduous in demonstrating their remarkable cures than the medical men who treat the opposite condition with just as striking results.

I do not propose to discuss the advanced types of hypothyroidism known as cretinism and myxedema. These conditions are well marked and the diagnosis is usually obvious. The cases that I wish to bring to your attention are the mild types which show some signs and symptoms of myxedema, but are not severe enough to be classified under that name. They are usually classed as simple hypothyroidism or minor thyroid deficiencies. They are fairly frequent, if one looks for them. It may be said that some of them are not true hypothyroidism. That I do not deny. But until we know more about the endocrins, I shall so classify those that respond to thyroid medication.

These mild types are frequently overlooked and treated as simple obesity, neurasthenia, psychasthenia or just plain laziness. Most cases of hypothyroidism are in women. According to Boothby and Sandiford, the ratio is about five to one. The condition usually occurs during or after the menopause. The cause is underfunction of the thyroid gland, but whether this underfunction is due to gland changes or depressed secretion from other influences cannot at present be said.

In considering the diagnosis it will be necessary first to enumerate some of the symptoms of myxedema as given by Kocher.

The appearance is expressionless and senile.
There is depression and poverty of thought.
The skin and hair are dry. No sweating.
Eyes show narrow lid slits.
There is obesity.
A slow pulse.
Slow digestion and excretion.
A constant feeling of cold.
Stiffness and pains in extremities.
Slow metabolism.

The mild cases show some of these symptoms to a degree but not sufficient to bring up visions of myxedema.

The common complaints are fatigability, mental depression, obesity, constipation and menstrual disturbances in women. Other symptoms may be chilliness, even in warm weather, vague aches and pains, biliousness and dryness of the hair and skin.

Physical examination does not show anything remarkable. The patient is usually overweight, the skin is dry and has a muddy icteric tint, often with brownish splotches. The pulse may or may not be slow but the blood pressure is usually low. The reflexes are unchanged.

Laboratory Findings. — The blood usually shows a lymphocytosis. The blood sugar is lowered and carbohydrate tolerance is increased. Basal metabolism is usually low.

*Clinic, General Clinical Session, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Normal metabolism falls fairly constantly between plus 15 per cent and minus 10 per cent. Rates below minus 10 per cent indicate some depression of function of the thyroid gland. Whether this lowered function is due to disease of the gland itself or to other influences is indicated by response to treatment. Only recently has accurate metabolism been available for general use. Means found that all cases with a definite picture of hypothyroidism invariably showed low metabolism. Complete removal of the thyroid gland lowers the metabolic rate to about minus 40 per cent. Therefore, in the mild cases we should expect only small changes. In 86 cases of questionable hypothyroidism, Means found that

9 per cent showed a normal rate;
61 per cent were minus 11 to minus 20; and
30 per cent were below minus 20.

Other conditions which may cause low basal metabolism are hypo-pituitarism, hypo-suprarenalism, diabetes and possibly other ductless gland diseases.

The metabolic rate does not always indicate correct diagnosis and should be considered, like all laboratory tests, not a diagnosis, but a clinical observation to be correlated with other findings.

A low metabolic rate only helps to confirm the diagnosis suspected from clinical observation. Still, one can not say that the condition is due to thyroid disease. Only after a definite benefit from thyroid administration can one feel that the function of the thyroid gland was at fault.

TREATMENT

Commercial preparations are notoriously variable in strength and I prefer to start treatment with thyroxin. Thyroxin shows a quantitative relation to the metabolic rate. One mg. thyroxin is equivalent to one gram of the dried gland and will raise the metabolism 2.8 per cent. Normally the daily requirement of thyroxin is 1 mg. It may be given intravenously or by mouth. Thyroid or thyroxin should always be given on an empty stomach, preferably one hour before meals. The dosage usually given is too small, for the normal individual can take the full amount required daily without symptoms of hyperthyroidism, as the thyroid seems to manufacture thyroxin only as needed. Absorption does not always take place and there is no effect, but insufficient dosage is the common cause of failure of results.

General glandular therapy is disappointing, as there are no uniform results and it is difficult to determine cause and effect. Basal metabolism is of value in controlling dosage and we should try to keep the rate at about normal level.

There are two conditions which I have observed in some of these cases: one is, frequent symptoms of gall bladder disease, that is, a muddy complexion with icteric tint, biliousness and occasional attacks of pain suggesting gall stone colic. Since the liver plays an important part in carbohydrate metabolism and in removing toxic substances from the blood, we might expect it to show some functional strain in this disease.

Another condition is the lowered resistance to infection and tendency toward chronic infections. Whether this is an inability to produce sufficient immune bodies to protect remains to be shown. I have not seen the thyroid mentioned in relation to immunity production.

Case 1.—(Presenting patient.) Mrs. G., age 36, was referred by Dr. Charles Norburn. At the age of 17 she weighed 146 pounds. Following septic poisoning in 1911, she began to gain weight. She has always suffered intensely during menstruation. For the previous eight years she has had one infection after another.

She increased in weight, was nervous and depressed, had menstrual disturbances, headaches and marked constipation.

On examination, May 5, 1927, her weight was 280 pounds, 150 over normal. Her temperature was 98, pulse 60, blood pressure 104-78. The skin was not dry but rather thick with muddy complexion. General physical examination was negative. The blood contained 40 per cent lymphocytes. The basal metabolic rate was minus 8. The patient was put on thyroid and improved markedly. She lost 50 pounds and says for the first time in her life she does not suffer.

She became pregnant for the first time and was delivered at term October 17, 1928, by Dr. Watkins. The child had a normal appearance and measurements but showed extreme emaciation. Its weight was four pounds. It died after eleven hours. There was no autopsy. We should like to know the cause of this condition, and the patient would like to know whether she can have a normal child.

Case 2.—Mrs. H., age 49, was referred by Dr. L. M. Griffith. She had had iritis for 2½ years. Her general health had always been good. She felt well, but had been rather depressed about her eyesight. She tired easily. She was not constipated. She consulted me for study in regard to focal infection which caused iritis. Her weight was 136 pounds, height 63 inches, temperature 97, pulse 70. The skin was rather dry and showed an icteric tint.

General examination was negative. X-ray of the lungs and gall bladder was negative. The blood showed 30 per cent lymphocytes. The blood sugar

was 89 mg. The basal metabolic rate was minus 14 per cent.

On thyroxin she is improving. She says she feels better than she has for three years. There has been no recurrence of the acute attacks of iritis and the chronic condition has improved about 50 per cent.

DIABETES AND TUBERCULOSIS*†

By R. D. TOMPKINS, M.D.,
Oteen, N. C.

Attempts at therapy for the combined diseases, diabetes mellitus and pulmonary tuberculosis, in the pre-insulin days were fraught with disaster, and were a trial and tribulation to physician and patient.

To furnish foodstuffs available and safe for a diabetic, one had to steer carefully to avoid undue deprivation to the tuberculous patient. In this Hospital we are, of course, primarily interested in pulmonary tuberculosis, but patients with this disease are sick for a long time, and it is therefore not to be wondered at that we see in them many other diseases and have to treat these diseases and study them. Always the tuberculosis must be borne in mind and its modification by the second disease must be considered. Thus, in this Hospital in the last few years we have seen the disease diabetes mellitus in patients with tuberculosis or in patients sent here for observation for that disease, and have had to consider the most desirable way of handling these two diseases when they occur in the same patient. It may be of interest to you to hear what has happened to the patients with diabetes mellitus coming to this Hospital.

Let me first briefly describe the material. A complete history and examination will not be attempted nor will the dietetic details be gone into at length, but only the more important and striking data, as I see them, will be brought to your attention at this time. In the last 4,500 patients admitted here there have been 14 with diabetes mellitus.

No. A entered August 11, 1925, and was discharged September 9, 1927. On entrance his sputum was positive for tubercle bacilli, he weighed 150 pounds, there was cavitation of the right upper lobe with rather extensive involvement of the left lower, and the completed diagnosis was chronic pulmonary tuberculosis far advanced "B." In December, 1925, sugar was discovered in the monthly routine examination of the urine. Further urine studies and blood sugar determinations confirmed the diagnosis, and he was placed on a rather liberal but weighed diet, furnishing 2,700 calories. On this diet without insulin he retained his weight, had a blood sugar of 160-200 mg. per 100 c. c. and was usually aglycosuric. In spite of the satisfactory condition as far as the diabetes was concerned, and though he was on strict infirmary treatment, the tuberculous process continued to advance to such an extent that by August, 1927, the right side of the chest was considerably more involved than at entrance. Many cavities were present in this side and the left side was also showing some extension. When he left the Hospital September 9, 1927, his diabetes was under control, but the tuberculosis was extending.

No. B entered this Hospital January 18, 1926, with a diagnosis made a few weeks previously of pulmonary tuberculosis and diabetes. Precedence could not be determined. On admission the tuberculosis was of the moderately advanced "B" type and the weight was 125 pounds. His blood sugar, urinary sugar and acetonuria were rather hard to control for the first few months, but with a food total of 2,562 calories, weighed and balanced and containing 180 grams of glucose formers, with 40 units of insulin per day, the blood sugar was easily kept between 133-166, while the urine remained free from sugar and acetone. Despite the fair control of the diabetes, the tuberculosis continued to advance on strict infirmary treatment. There was extension to both lungs, increased cavitation and increased toxemia. The patient left the Hospital in August, 1926, and died a few months later.

No. C entered our Hospital November 23, 1926, and was discharged April 12, 1927. His diabetes was discovered in November, 1924, the pulmonary tuberculosis in April, 1926. At entrance his pulmonary tuberculosis was of the far advanced "B" type. He was taking a total of 90 grams of glucose formers a day, but with 60 units of insulin was excreting 50 grams of sugar in the urine. The urine also showed acetone. His entrance x-ray report indicated involvement of all lobes of both lungs with cavitation of the right lower. A few days after admission he manifested symptoms of acidosis: nausea, vomiting, was slightly stuporous, and had increased acetonuria. He never went into coma, but was quickly brought out of the above condition by omitting fats from his diet, increasing the fluids and increasing the insulin. By January 24, 1927, he was taking a diet amounting to 2,150 calories and containing 180 grams of glucose formers, but requiring 150 units of insulin daily. His weight was 113, he had a high morning blood sugar of 300-400, but his urine showed very little sugar and was free of acetone. By juggling and changing the time of the insulin doses the morning blood sugar quickly dropped and in a few weeks reached 200 as a high level and remained at or below this figure when the diet was increased and the insulin dosage decreased to 100 units. His weight increased to 137, a gain of 24 pounds, and his temperature was reduced to a range of 36.4-37.4, but x-ray on March 18, 1927, showed that marked extension with increased caseation had taken place in both lungs since November 24, 1926. When he left the Hospital the diabetes was under control, but the pulmonary tuberculosis was extending.

*Clinic, Clinic Session at U. S. Veterans' Hospital (Oteen), Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†From the U. S. Veterans' Hospital. Published with the permission of the Medical Director of the U. S. Veterans' Bureau, who assumes no responsibility for the opinions expressed or the conclusions drawn by the writer.

No. D was admitted here January 27, 1927, and discharged May 1, 1927. Both his far advanced "B" pulmonary tuberculosis and his diabetes mellitus had been found at the same time, namely: in January, 1927. He showed a fibrous lesion in the right upper lobe with scattered fibro-caseous lesions in the right lower, extensive fibro-caseous involvement on the left lower and a 3 cm. cavity in the left lower. His weight was 120 pounds and the temperature range was 36.6-38°C. He had glycosuria and a blood sugar on entrance of 250. On 1,830 calories of balanced and weighed food containing total glucose formers of 115 grams, with 35 units of insulin, his blood sugar diminished to 166 and the urine became aglycosuric. With increased carbohydrates the blood sugar remained at about this level and the urine continued free of sugar. The temperature began to decline after April 10, 1927; the weight increased to 125, he felt better, but though on complete infirmary treatment, the x-ray in April showed an extending process with increasing caseation of the pulmonary tuberculosis. The patient left the Hospital May 1, 1927, the diabetes under control, but the tuberculosis advancing.

No. E I will only mention briefly. This patient came in May 24, 1927, under observation for tuberculosis, but was found to have acute lobar pneumonia. He had a mild diabetes. He did well on a diet of 75 grams carbohydrate, 60 grams protein, and 180 fat, with 10 units of insulin daily. In a few days he had a crisis, which was followed by a rapid recovery and he was discharged June 3, 1927. Apparently the acute lobar pneumonia with diabetes was more satisfactorily handled than the tuberculosis with diabetes.

Nos. F and F refer to the same patient at different periods of hospitalization. He entered first June 24, 1927. His history is not entirely clear, but he probably had tuberculosis preceding the diabetes. The diabetes was diagnosed in April, 1927. On admission, x-ray showed involvement of both lungs more marked in the lower lobes with a 4 cm. cavity in each lower lobe. His weight was 130 pounds, blood sugar 150-266 and urine negative for sugar on a total caloric content of 2,885 containing 185 grams glucose formers with 24 units of insulin daily. He felt fairly well, but on July 26, 1927, a month following entrance, another x-ray showed more caseation in the right lung and the cavity in that lung was larger. He left the Hospital two days later. The diabetes was under fair control, but the pulmonary tuberculosis was advancing. He returned to the Hospital Nov. 24, 1927, with a weight of 135 pounds, but with a sharp attack of fever and a pulmonary tuberculosis of far advanced "B" type. His x-ray then showed more extension in the left lung and increase in the size of the cavity in that lung. The blood sugar was 800, 500, 333 and 300 mg. for the first two weeks and there was sugar in the urine. On a diet of 1,830 calories with 115 grams of glucose formers and 60 units of insulin the blood sugar rapidly dropped to 170-200 and continued at this figure, though with increasing diet. The patient would show sugar-free urines in all specimens of the day except the specimen containing the 7:00 morning to 12:00 noon urine; this would show a trace, at times of 1 gram of sugar. By changing the time of insulin dosage this cleared up and remained so. His temperature dropped to normal, he gained 12 pounds in weight in the three months he was here and the x-ray in January showed marked improvement over the November one with disappearance of cavities in both lowers, and these were large cavities, and with considerable contraction and formation of fibrous tissue. Notwithstanding this remarkable improvement, the patient left the Hospital February 26, 1928. This case was able to show improvement in both tuberculosis and diabetes.

No. G, admitted August 4, 1927, and discharged August 16, 1927, had diabetes in 1918 and the pulmonary tuberculosis developed in 1923. His weight on entrance was 162 and 12 days later, on discharge, was the same. He had far advanced "A" pulmonary tuberculosis with fibro-caseous involvement throughout both lungs, a 3 cm. cavity in the right lower and a 4 cm. one in the left lower lobe. Blood sugar was 500-600. He had been under treatment by many physicians in the past who had paid more attention to the diabetes than to the tuberculosis and when we, paying the proper attention to the tuberculosis as well as the diabetes, were compelled to diverge to an extent from the line of treatment he had laid out for himself, a line of treatment which he considered his long experience with diabetic specialists fully justified him in instituting, he became hostile to our treatment and would have nothing to do with it. He therefore left the Hospital without change in his condition.

No. H was admitted here August 11, 1927, and was discharged September 14, 1927. His diabetes was diagnosed in 1926, and though he had had cough for several years prior to that time, the tuberculosis was not definitely diagnosed until 1927. He weighed 138 pounds on admission and was a far advanced "C" case. His basal requirements were 1,680 calories and he was fed 2,190 calories with 144 grams of possible glucose formers. On this diet he required 20 units of insulin daily to keep the urine sugar free and blood sugar below 170. His x-ray showed fibro-caseous involvement throughout both lungs. He was toxemic, very sick and, although the diabetes was controlled without great difficulty, the pulmonary process extended rapidly and the patient died September 14, 1927. The cause of death was pulmonary tuberculosis. Autopsy showed nothing of extraordinary interest in the present connection.

No. I was admitted August 13, 1927, and discharged April 8, 1928. Although on entrance the x-ray showed only a moderately advanced lesion of the right lung while the left lung was clear, the case was classed as far advanced because of a tuberculous epididymitis with a draining sinus. The urine was negative for sugar and there was no suggestion of diabetes. Surgical attention was given to the testicle, the patient placed on proper treatment for pulmonary tuberculosis, and in a few months his weight had increased from 136 to 150 pounds. He then began to lose weight, dropping to 129 pounds, and sugar began to appear in the urine. He showed a sugar loss of 3-20 grams daily and a blood sugar usually around 190-200 mg. per 100 c. c. At the same time the process in the lungs, which was largely fibrous, began to take on a softer appearance and to show more caseation. His basal requirement was 1,650 calories. He was put on a diet containing 2,170 calories with 130 grams of glucose formers and 16 units of insulin daily. The urine became sugar free, blood sugar declined to normal, insulin was reduced to 8 units daily, the weight increased to 148, a gain of 20 pounds, and the temperature began to drop. However, the x-ray of the chest showed increased extension of the process in the right lung with possibly beginning small multiple cavities there. The patient left the Hospital April 8, 1928. Although the diabetes was under control, the tuberculosis was extending.

No. J, admitted October 7, 1927, is still in the Hospital. His x-ray showed small fibrous masses in the right upper lung, while the left lung was clear. The tuberculosis diagnosis was moderately advanced "A," blood sugar was 200-220 mg. and he excreted 25-30 grams of sugar daily on a diet including 110 grams of glucose formers without insulin. His weight was 124 pounds. His basal requirements were 1,600 calories and he was fed 1,830 with 125 grams of glucose formers. On this diet and with 20 units of insulin his urine became sugar free and his blood sugar was reduced to 180. The sputum was positive for tubercle bacilli until January, 1928, and since then negative. The x-ray showed a slight amount of clearing in the right upper, his weight increased to 137.5 pounds. At times the insulin has had to be increased, but so far it has not been difficult to keep the urine sugar free and the blood sugar within reasonable bounds. This patient differs from the others in that his moderately advanced tuberculosis is not extending, but the diabetes is harder to control, or at least gives some indications of progressing.

No. K, admitted March 5, 1928, is also still in this Hospital. He had, on entrance, chronic pulmonary tuberculosis, advanced "A," and the increased blood sugar was discovered in the course of a blood chemistry study initiated to discover if possible the cause of certain neuritic and cardiac symptoms manifested by the patient. On various tests the blood sugar was found to be 250-300, and further study of the urine revealed sugar in small quantities. Sugar disappeared on a weighed, rather liberal diet, containing 185 grams of glucose formers and remained absent without the aid of insulin. His weight remained about the same, namely: 185 pounds, but the temperature increased and the disease advanced to the "B" type. X-ray showed fibrosis and caseation throughout the right lung with a large cavity in the left upper. In this case the diabetes is under control, but the tuberculosis is apparently advancing.

No. L was admitted June 17, 1928, and is still in the Hospital. His history suggests that tuberculosis was present in 1919, while the diabetes developed in 1923. On admission it was found that he had a far advanced pulmonary tuberculosis "C," with fibro-caseous involvement from the apex to the third rib on the right, while the left lung was entirely obscured by thickened pleura. However, on physical examination the left lung showed distinct signs of cavitation. Blood sugar was 250-400. He was taking insulin on arrival here. His basal requirements were 1,700 calories and he was placed on a weighed diet of 1,840 calories with 60 units of insulin daily. His temperature dropped to normal and his weight increased from 107.5 to 138 pounds. He feels better and is improving clinically, but shows no signs of improvement on physical examination of the chest.

No. M, the final patient in this series, was admitted with a diagnosis of chronic pulmonary far advanced tuberculosis "C" and diabetes. The diabetes came under control with a fairly liberal weighed diet and no insulin, but the tuberculosis steadily advanced and the patient died October 23, 1928.

While I do not feel that we are entitled to draw any very positive conclusions from this small series, still, as far as these cases may be taken to point to conclusions, we may decide:

First: with proper diet and insulin, diabetic patients with far advanced pulmonary tuberculosis can be kept in an excellent state of nutrition and be made to gain a proper amount of weight.

Second: the diabetes itself, as shown by blood and urine sugar, is fairly easily controlled by means of insulin and diet.

Third: although these histories do not warrant a conclusion as to how strong a predisposing factor diabetes mellitus is in the development of pulmonary tuberculosis, they do suggest that pulmonary tuberculosis progresses with rapidity in the presence of diabetes. It has been suggested on purely *in vitro* experiments as far as I know, that the low resistance to tuberculosis in patients with diabetes is due to increased glycerol in the blood rather than to the increased blood sugar. In view of the comparative ease of control of the blood sugar with insulin and diet and considering the abnormal fat metabolism in diabetics, this is a theory worthy of study.

With eight of the patients out of fourteen leaving the Hospital before their treatment was completed, one is tempted to conclude that this Hospital does not do its full duty when it fails to persuade these patients to remain for further treatment. Perhaps increasing experience will teach us how to do that, but so far it has been an extremely difficult task, especially when these men begin to feel better, treatment begins to pall and nostalgia overcomes critical judgment.

A CASE OF THROMBO-ANGIITIS OBLITERANS

Turning to a more pleasing picture, let me report to you the history of a patient with pulmonary tuberculosis who had a different complicating disease, a thrombo-angiitis obliterans. Although this disease is apparently not precisely rare, this is the only case, according to our records, which we have had in 15,000 admissions. So it is certainly not common and is interesting and remarkable enough to warrant reporting when seen.

Vascular lesions affecting the extremities may be functional or organic in origin. Raynaud's disease, first described by Raynaud, and erythromelalgia, originally described by Weir Mitchell in 1878, are typical of the first class, while thrombo-angiitis obliterans is an outstanding example of the second group. Thrombo-angiitis obliterans was the name suggested by Leo

Buerger in 1908, after he had made careful clinical investigation and thorough anatomical study of the vessels in amputated legs of certain patients with a characteristic syndrome coming to his attention. Although prior to this time these cases had been confused with the functional vascular lesions or had been called endarteritis obliterans or arteriosclerosis with gangrene or embolism with gangrene, the anatomical studies made showed the condition to be a clinical and pathological entity. The acute inflammatory process of the vascular coats of the arteries and veins, the round cell infiltration, the formation of the thrombus and its organization and canalization, the surrounding periarteritis tying artery, vein and nerve together, the tendency of the thrombus to extend, the accompanying peculiar migrating phlebitis, all pointed to a distinct and separate disease.

The patient, a white male who is now 38 years of age, was born in New York. His parents came to this Country from Ireland. He entered this Hospital July 25, 1924, for the treatment of far advanced chronic pulmonary tuberculosis "A." Nothing of extraordinary interest occurred during his more or less routine treatment for pulmonary tuberculosis until recently. The patient at times presented symptoms of a neurosis of functional type and a few minor symptoms of no particular significance, but these things did not cause him a great deal of annoyance. He used tobacco to the extent of fifteen or so cigarettes a day. For a few months prior to the developments to be described he had been going to the mess hall for meals and had been out of bed for about eight hours a day.

On November 9, 1927, he noticed the first symptoms of trouble with his legs. At that time he complained of an aching sensation in the legs, had a temperature of 37.4° C. and asked to be excused from walking to the mess hall for meals. This, of course, was done, and though soon the patient was excused from all unnecessary activities and allowed to have all meals on the semi-ambulatory ward where he was then living, the aching did not entirely cease, but persisted slightly. At this time no physical signs were found and it appeared that the condition was not of great severity.

About the middle of December, though, it became worse; the pain increased and was localized in the right ankle. Also slight redness and swelling of the right foot and ankle appeared and the temperature began to assume a more continuous type, though even at that time seldom going higher than 37.4°. The process continued to advance and by January 1 had reached such a stage that more definite observations could be made. From then until February there was a fairly uniform, daily, morning and afternoon temperature range of 37-38° C. The patient complained of pain in the right foot of such severity that he could not sleep at night, but could only sit up in bed, changing the position of the foot constantly, smoking most of the night, going to the bath room, hanging the foot out of bed and then elevating it, rubbing it, applying heat and sleeping only a couple or so hours each night, even with the aid of repeated doses of morphin.

The foot was swollen, more marked on the dorsum at the base of the toes. It was cold and clammy to the touch, definitely and distinctly colder than the other foot. The coldness, though at first more marked over the dorsum of the foot, within a couple of weeks had extended to about the middle of the leg and then, later, to above the knee. The toes of this foot were red, swollen and rather cyanotic when the foot was in a dependent position, but blanched and became quite pale when the foot was elevated to 90-180 degrees. On palpation there was entire absence of pulsation in the dorsalis pedis, posterior tibial and popliteal arteries, although the same arteries on the left side showed pulsation on palpation. Oscillation of the mercury of the sphygmomanometer was entirely absent on this side to the level of the middle of the thigh, but there was distinct oscillation on the other side. The blood pressure in the arm was 120/80. The roentgenogram of this foot did not reveal calcification of the arteries nor was there any bone abnormality. The urine was negative. The blood chemical findings were normal, both for nitrogen retention products and sugar. The red blood cells numbered five million, the whites 13,200 with 77 polymorphonuclears, 17 lymphocytes and 6 per cent large mononuclears. Bleeding time and coagulation time were not particularly significant. If anything they were a trifle prolonged.

The general condition of the patient became worse. He looked tired, worried and haggard; his appetite began to fail; his pulse rate increased. The toes, especially the great, second and third, became purplish, cyanotic and waxy in appearance. An ulcer appeared between the fourth and fifth toes. The purplish discoloration began to extend up the foot and a definite gangrene appeared.

On January 25, 1928, an iodized oil injection, 3 c. c. in the femoral and three in the profunda arteries, was made. Immediately following this x-ray pictures of the leg were made. The pictures were not entirely satisfactory, but indicated that a very slight and insufficient collateral circulation was present.

In view of the age of the patient, the excessive smoking of tobacco, the peculiar nature of the pain, the presence of an obliterative lesion as shown by the absence of pulsation in the dorsalis pedis, posterior tibial and popliteal arteries on that side, the circulatory efficiency test, the decreased temperature of the skin over the affected area, the x-ray lack of evidence of arteriosclerosis or bone change, the laboratory tests, the history and clinical features, a diagnosis of thrombo-angiitis obliterans was made.

Following the injection of the oil, the incision healed promptly, but as the gangrene continued to advance and the patient continued to fail, amputation of the right leg at the mid-thigh region was done on February 6. Following the amputation the patient had a superficial phlebitis of the other thigh for a few days and then began to improve. The report of the pathologist on the amputated leg confirmed the diagnosis of thrombo-angiitis obliterans.

The patient has continued as a strict 24-hour bed patient since the amputation. The stump healed nicely and is now in excellent shape. The other leg, with the superficial phlebitis immediately following the amputation and the subsequent presence of slight coldness of the ankle and weak pulsation of the dorsalis pedis and posterior tibial arteries, suggests a similar obliterating process which is apparently arrested and not advancing. Finally I should like to call your attention to the fact that the pulmonary cavities which the patient

had for many years before this operation have now entirely closed and the pulmonary process has definitely improved. The weight of the patient has increased 25 pounds since the operation and he is happy, comfortable and contented.

Summary.—(1) This report shows a thromboangiitis obliterans developed in a man with pulmonary tuberculosis.

(2) The age, 38 years, at which the disease developed was in the usual age period, but the patient was of Irish descent and not of Hebraic origin.

(3) The case shows a rather rapidly developing lesion without a preceding history instead of the usual slower development and history.

(4) It presented a factor which has been advanced as of etiological significance, namely: the smoking of cigarettes, but also bears rather strong resemblance to an acute infectious process.

(5) A strong suggestion is seen in the superficial phlebitis and the other symptoms present in the other leg of a basically similar process there.

(6) This case shows in a typical manner the symptoms of an obliterative lesion in contradistinction to a vaso-motor one.

(7) A striking confirmation of the value of rest in the treatment of pulmonary tuberculosis is seen in the closure of the cavities during the enforced total bed rest following the amputation.

CAUTERY IN TUBERCULOSIS OF THE TONGUE AND LARYNX*†

By GEORGE H. B. TERRY, M.D.,
Oteen, N. C.

In our Hospital it is the custom to refer patients showing lesions on the tongue to the Eye, Ear, Nose and Throat Department. During the last three years we have had ten cases showing tuberculous ulceration.

Case 1 showed an ulcer of considerable size on the tongue as well as ulceration in the lower jaw. He was referred to our Department with a request for a biopsy on the tongue. We advised against this procedure, but it was done by another surgeon, and the lesion proved tuberculous. Following the biopsy the lesion rapidly spread and the patient died in six weeks of his pulmonary tuberculosis.

Case 2 had an ulcer on the tongue of three years' duration. Following four cauterizations at intervals of from two to six weeks, the patient was transferred to another hospital with the lesion on his tongue much improved.

Case 3 showed an ulcer about the center of the tongue of five weeks' duration. This was cauterized four times and was considerably improved at the time of the patient's death from his pulmonary lesion four months later. Post-mortem section showed the lesion to be tuberculous.

Case 4 showed tuberculous ulceration on the left side of the tongue far back, cauterized on July 13, 1926. He was discharged from the Hospital five months later with the ulcer completely healed.

Case 5 showed a large, painful ulcer on the under side of the tongue near the tip. Symptoms were entirely relieved after a few cauterizations and he died ten months later of his pulmonary tuberculosis without recurrence of ulceration.

Case 6 showed ulcer of three weeks' duration on the right side of the tongue far back. This was cauterized and gave no trouble for one month, when some tenderness was again noted. It was not necessary, however, to recauterize. This lesion remained healed, but a year and a half later he developed another ulcer about the center of the tongue, which yielded to two cauterizations.

Case 7 came to us by transfer from another hospital with an ulceration on the tongue of one year's duration. He had been treated for six months with a quartz lamp without benefit. We did one cauterization and the ulcer healed entirely and remained healed up to the time of his death from pulmonary tuberculosis a few months later.

Case 8 showed two small lesions on the upper surface of the anterior portion of the tongue. These were painful and had existed for several months. One cauterization was done. The patient was discharged from the Hospital ten days later with the ulceration entirely healed.

Case 9 had ulceration on the right side of the tongue of three months' duration. After one cauterization it completely healed. Examination one year later showed no recurrence.

Case 10 had a large ulcer on the right side of the tongue. Cauterization was done. This was repeated in two months. Two months later the patient left the Hospital against medical advice with the ulceration entirely healed.

All of these patients except *Case 5* had negative Wassermanns. Practically all of them had been treated with nitrate of silver or other medicaments before they were sent to us for cauterization.

Of the nine patients cauterized, six secured complete healing. Two left the Hospital much improved and one died of his pulmonary lesion before the tongue had entirely healed.

We know of no other tuberculous lesion that

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*Clinic, Clinic Session at U. S. Veterans' Hospital (Oteen), Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†From the U. S. Veterans' Hospital.

responds to treatment so well as these ulcerations of the tongue.

Laryngeal tuberculosis, as is well known, is a frequent complication of pulmonary tuberculosis. One of the earliest signs is a hyperemia of the vocal cords. When this occurs it is necessary to differentiate between tuberculosis, syphilis and irritation from excessive cough or chronic tonsillitis as a causative factor. The patient should at once be placed on voice rest and re-examined from time to time when the subsequent changes will usually make the diagnosis clear. In the presence of pulmonary tuberculosis and a positive Wassermann, the diagnosis, however, may long remain in doubt unless the patient can be put on active anti-syphilitic treatment as a therapeutic test. The usual pathological condition in laryngeal tuberculosis is general infiltration of the larynx, edema of the arytenoids, proliferations in the posterior commissure, a thickening of the epiglottis or even ulceration. The most frequent site for ulceration is the vocal cords or the epiglottis, although it is not infrequent in the vocal bands or arytenoids. When the diagnosis is made the treatment should be begun. The two lines of treatment that we have found most efficient are voice rest or electric cauterization, and there are many cases in which it is the part of wisdom to begin the voice rest long before the diagnosis is definitely established. Any patient with pulmonary tuberculosis who has a tendency to hoarseness should be put on voice rest. If this were more often done we believe that the incidence of laryngeal involvement would be much decreased. The best kind of voice rest is absolute voice rest, the patient using a pad and pencil instead of his vocal cords. With patients who will not do this we urge that a whisper be substituted for ordinary speech. Smoking is usually thought to be harmful, but we believe that most addicts can smoke in moderation without harm to the larynx and with some benefit to their morale.

After the patient is placed on voice rest he should be re-examined each month. He should be examined oftener if symptoms demand, but only if symptoms demand. Disturbing the patient for frequent examinations, or, what is worse, for various topical applications, is as much contra-indicated as is the too frequent removal of surgical dressings from a healing wound. Under this treatment a fair number of cases of undoubted laryngeal tuberculosis will recover, especially if the pulmonary condition is improving. The course of the laryngeal disease does not by any means, however, always follow that of the pulmonary. One of the most malignant cases of laryngeal tuberculosis that we have ever seen occurred in a patient whose pulmonary lesion was not extensive and was thought to be improving. On the other hand, time after time we have seen the laryngeal lesion heal under appropriate treatment and stay healed, while the pulmonary condition went from bad to worse.

If the monthly examination shows that the patient is not making satisfactory progress under voice rest, electric cauterization is done under local anesthesia from moistened cocain flakes applied two or three times to the area involved and preceded by a spray of 4 per cent cocain to prevent gagging. The indirect method of illumination is used, the cautery point placed cold on the area of ulceration and the current applied until the area is well seared. For the epiglottis and arytenoids a pointed electrode is frequently used and punctures are made into the swollen area in addition to surface cauterization. After-treatment consists of nothing at all except occasionally it is necessary to give an analgesic for the pain. This rarely occurs, as in the painful cases the cauterization usually at once relieves pain. The patient is re-examined in one month and if necessary the cauterization is repeated. Of the last 68 patients operated upon

30	received	1 cauterization
23	received	2 cauterizations
6	received	3 cauterizations
3	received	4 cauterizations
3	received	5 cauterizations
1	received	6 cauterizations
1	received	11 cauterizations
1	received	12 cauterizations

Some laryngologists believe that a cauterization should not be done if the case is hopeless from a pulmonary standpoint. With this belief we are not in accord. In many cases, hopeless from both a laryngeal and a pulmonary standpoint, the operation is indicated for the relief of pain. In such a case we usually do not urge a recauterization, but do it at the patient's request as a palliative measure.

How long should the interval be between cauterizations? A month as a rule, but this is a rule to which there are some exceptions.

The two patients referred to as having had 11 and 12 cauterizations, respectively, were both hopeless cases and the cauterizations were repeated at the patients' request as a palliative

measure only. In one of them several cauterizations were done at weekly intervals. No untoward effects were observed, but the pain was markedly relieved.

Other methods for the relief of the intolerable pain include the painting of painful granulations with 10 per cent nitrate of silver, orthoform locally, cocain spray and sometimes the injection of the superior laryngeal nerve with 20 minims of alcohol. In our experience this last measure is usually unsuccessful, but occasionally has given wonderful results.

Our experience with the electric cautery leads us to believe:

(1) That it will result in healing nearly all cases of tuberculous ulceration of the tongue if used reasonably early.

(2) That it is the best method of treating the tuberculous larynx that fails to yield to voice rest. With early lesions complete, healing is the rule after a few cauterizations. With most of the advanced cases it is the most efficient method for the relief of the excruciating pain and enables the patient to take much needed food. Many of these cases are not so hopeless as they look and healing will often take place following cauterization of extensive lesions.

(3) Not the least of the advantages of the cautery treatment is that it interferes but little with the bed rest so important in the treatment of the pulmonary disease.

RETROPERITONEAL TUMORS*

By JOHN M. MAURY, M.D., F.A.C.S.,
Memphis, Tenn.

Retroperitoneal tumors are of interest because of their relative infrequency and the absence of charcteristic symptoms. They may be cystic or solid, the cysts arising from vestigial remains, most frequently from remains of the Wolffian body. Solid tumors arise from the connective tissue structures, the vessels, the lymph glands and the sympathetic nerves. A large proportion of the solid tumors are sarcomas of various types (Schmid says about 50 per cent are malignant). Less frequently are found lipomata, fibromata, fibromyomata and myxomata. Of 267 retroperitoneal tumors studied by Schmid,[7] 77 were in the mesentery, 138 were entirely retroperitoneal, and 52 were both mesenteric and retroperitoneal. In size they vary greatly, being sometimes sufficiently large to fill the abdomen and extend into the plevis. Negrisoli[5] refers to tumors weighing 55 to 65 pounds and measuring a meter in circumference.

Because the symptoms to which they give rise are varied and in no wise characteristic, very few are correctly diagnosed before operation. In fact, the presence of a tumor is sometimes the only sign. Existing symptoms are usually the result of mechanical interference with organs which are in juxtaposition to the tumor. Persistent diarrhea has been noted in several cases. Pain is fairly constant as a symptom and fixation may or may not be marked. Digestive disturbances, intestinal obstruction, dyspnea, palpitation and urinary disturbances have been recorded. When they are mesenteric, ulceration into the intestinal lumen and torsion of the pedicle resulting in necrosis of the tumor and intestine have been noted (Negrisoli[5]).

The tumor may be in such relation to the viscera as to necessitate resection or total removal of the organ involved. Intestinal resections, splenectomies, nephrectomies and cholecystectomies have been necessary in some cases.

CASE REPORT

A white woman, 45 years of age, married and the mother of three children, was considered to have, as a provisional diagnosis, uterine myofibroma. The final diagnosis was retroperitoneal fibroma.

For seven or eight years she had had a dull aching pain low down in the left ovarian region. There was no soreness until the previous few weeks, during which time it was at times quite marked. She has noticed a hard mass in this region for three months, which had increased in size. Menstruation was regular, every twenty-one days, lasting six or seven days. The last menses was two weeks before. Physical examination was negative, except for the pelvis and lower abdomen. In the left lower quadrant could be felt a hard, globular tumor reaching as high as the umbilicus and to the right of the median line. Pelvic examination showed the vulva normal, the perineum relaxed, the vagina normal, the cervix up behind the pubes. The pelvis was filled with a hard, smooth globular tumor. The uterus was pushed to the right and upward.

Operation presented no difficulties. The peritoneum was incised to the left of the rectum and the tumor easily shelled out. Only one vessel, the size of the radial, coming from the side of the pelvis, needed ligation. A rubber drainage tube was left in for twenty-four hours. The tumor had no connection with the uterus, ovary, tube, or round ligament.

Pathologist's Report.—In gross, a soft, solid tumor, nodular in outline was seen, size 15 x 11 x 7 cm., weight 512 gm. On section, the structure is composed of soft, yellowish tissue which is apparently undergoing

*Read in Section on Gynecology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

necrosis. There are scattered areas of white fibrous tissue. There are a number of irregular cavities, especially in the central portion. Their fluid contents are watery and hemorrhagic. Microscopic sections taken from four different areas show the characteristic structure of fibroma. The fibrous tissue is arranged in interlacing bundles. The nuclei are regular in size, showing uniform characteristics. In some areas there is considerable degeneration. (Signed) LEAKE.

It has been my privilege to operate upon one other retroperitoneal tumor which in nature was cystic. The case was reported in *Surgery, Gynecology and Obstetrics*, June, 1918. The cyst was of Wolffian origin, lying on the left side behind the descending colon with a tubular structure the size of the ureter running from the cyst down into the broad ligament, where it terminated below the tube. Microscopical examination showed the presence of well developed glomeruli.

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DISCUSSION (*Abstract*)

Dr. Marion T. Benson, Atlanta, Ga.—Retroperitoneal tumors are unique in two respects: the rarity of their occurrence and the rarity of their correct pre-operative diagnosis.

Their habitat seems not to be confined to any particular portion of the abdominal viscera. They can be either benign or malignant; cystic or fibrous. Benign retroperitoneal tumors are rather unusual. Only about 200 have been reported in the literature.

Since 1919, there have been a few cases of retroperitoneal fibromyoma reported. Ogilvie reports a case in an unmarried woman, aged 55, in whom the fibromyoma was attached to the second and third lumbar vertebrae. It was on the left side and about the size of an orange. The blood supply came from the lumbar arteries. The origin was assumed to be the anterior common ligament.

On July 22, 1927, I operated upon a large cystic retroperitoneal tumor with the attachments and location of that described by Ogilvie. I take this opportunity to report it.

This tumor was in a woman aged 60, filling up the entire abdominal space on the left side of the abdomen, pushing the intestines and diaphragm up and extending well down into the pelvis. The diagnosis of cystic left ovary was made previous to operation. There were no attachments to the uterus or appendages. The attachments, blood supply and origin, as I said, seemed similar to the case reported by Ogilvie. Magnoun reported two cases of retroperitoneal fibromyoma operated upon at the Mayo Clinic previous to 1919. Four cases have been operated upon since 1919 at the Mayo Clinic.

C. H. Mayo and Dixon, in 1927, stated that 22 patients with retroperitoneal lipoma had been operated upon in the Mayo Clinic since 1910 with removal of all or part of the tumor. Mayo and Dixon state that benign retroperitoneal tumor is often diagnosed ascites, ovarian cyst and occasionally inoperable malignant growth. One or two cases have been diagnosed as tuberculous peritonitis.

Retroperitoneal lipomas grow slowly and may attain considerable size before they are noticed by the patient. They rarely cause pain. Symptoms are variable and in a series of twelve cases reported by Masson and Horgan six of the patients first noticed a sensation of pressure in the abdomen. Six patients complained of slight intermittent abdominal pain and two of severe rather constant pain in the lower lumbar region. Six complained of qualitative food distress and occasionally vomited. Five complained of constipation and six had lost weight.

W. H. Whitmore, of the Medical Corps, U.S.N., reports a case of sarcoma which developed in a young man, aged 27. The origin was apparently in the stomach and the tumor extended through the stomach wall and formed a huge mass in the retroperitoneal space.

Bevers reports a large retroperitoneal fibromyoma attached to the apex of the bladder of a woman of 49. He believes its origin may have been in the bladder. There are other reports of fibromyoma of the bladder to substantiate this opinion.

Tumors of the kidneys and pancreas are retroperitoneal in location, but in addition to these, tumors are sometimes observed which are developed from retroperitoneal connective tissues. Lipomas and sarcomas being most frequent, form masses, carrying the posterior parietal peritoneum before them, according to Herztler.

SELECTIVE ANESTHESIA*

By W. HAMILTON LONG, M.D.,
Louisville, Ky.

If some propaganda for our own specialty is detected between the lines of this paper, or even makes its appearance frankly in the text, I have no apologies to offer, for I think it will be seen as we proceed: first, that scientific modern anesthesia is possible only with an anesthetist on the team, who is capable of serving in a consulting capacity in addition to being a skillful technician in all the mechanical phases of anesthesia administration, both general and regional;

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*Clinic, General Clinical Session, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

and second, that scientific anesthesia can not be routine anesthesia, and that the greatest safety to the greatest number of surgical patients is to be achieved only by selecting the agents, method and technic for the individual case and never by fitting the patient, willy-nilly, to a routine anesthesia.

"Safety—safety first" are the watchwords of modern anesthesia. Fear of the anesthetic and its outcome is the furtive phantom that is in the back of every surgeon's mind, and that haunts the patient and his friends. To those whose conception of anesthetic danger is entirely contained within the picture of that most tragic accident, an anesthesia death on the operating table, it can be stated that many deaths occurring one, two, three and four days after the operation are as surely caused by the anesthetic, poorly chosen, unskillfully administered, as are those due to collapse from respiratory paralysis or cardiac syncope on the operating table.

An anesthetic must be chosen, then, for its safety and its adaptability, that is, its ability to produce a degree of anesthesia that permits the proper performance of the contemplated surgery. When these two considerations seem to clash, then the safety factor must take precedence over the one of convenience. Contrary to the opinion of the average surgeon, he is not the best anesthetist, whose patient, under an ether anesthetic, for instance, is at all times completely relaxed, not even resisting an abrupt excursion of the exploring hand of the surgeon from the lower abdomen to the gall bladder region. On the contrary he is the best anesthetist to whom the surgeon may frequently appeal for deeper anesthesia, for he is always on that edge of depth which just permits the work under way; and is distinguishing clearly between ether anesthesia and ether toxemia, between what can be called the medicinal dose and the toxic dose.

We are able now, for the first time in the last few years, to give scientific, selective anesthesia to nearly every surgical patient. Newer knowledge of pathology and chemistry, brought out with late laboratory methods of diagnosis; newer knowledge of the pharmacology and physiological action of various anesthetic agents; growth of anesthesia knowledge and interest and the development of this work into a definite, full-fledged specialty; and finally, ability to coordinate and to evaluate properly all such knowledge, make scientific selective anesthesia possible, practical, perfectly feasible, and the practical application of it all renders a team as nearly "safe" as can be in this world of errors.

The object of this paper is not to advocate something strange to you; not to make a plea for something new to you. We realize that selective anesthesia as we understand it, has for at least ten years been making its appeal to all thoughtful, conscientious surgeons, internists and obstetricians. We simply wish if possible to hasten the universal abandonment of routine anesthesia in a diversified general surgical practice of wide range.

The surgeon who applies routine ether anesthesia on the principle often advocated, that in large surgical volume ether is the one universally applicable agent, with the widest margin of safety and the most nearly fool-proof, and that its routine use simplifies and expedites the day's work, will occasionally have a kidney function impairment that may be fatal, a pneumonia, or the lighting up of an old tuberculous process, he may augment shock that was pre-existent or that supervened during the operation. By the same token an effort to use either of the gases routinely will be met with the necessity frequently of synergizing nitrous oxide with ether, especially in upper abdominal work, even when local infiltration is used; and of abandoning ethylene because of the necessity for a cautery or for some other condition that brings forward the fire and explosion hazard of that extremely valuable agent. Heart function, "vital reserve," blood pressure, and pulse pressure, must be evaluated properly if regional anesthesia by spinal block is considered. Trans-sacral, and caudal block have their fields and their advocates, and like most technics their definite limitations. They are of value when properly adapted. The use of field block infiltration and caudal or spinal block may be accompanied by a purely psychic reaction of very distressing character, due entirely to the element of consciousness, however satisfactory the anesthesia. When to supplement this with light nitrous-oxide or ethylene anesthesia, merely to eliminate the element of consciousness and apprehension, becomes a nice point for consideration, as it brings us to a consideration of the temperament and nervous stability of the individual. Alkaloidal semi-narcosis with morphine, scopolamine and kindred drugs will suggest itself in conjunction with local and region anesthesia, as

well as with nitrous oxide and ethylene, but unless something is known of the individual's reaction to these agents, one may find one's patient, due to frequently existing idiosyncrasy, in a condition of mania, or delirium, or in the throes of almost continuous nausea and retching instead of the somnolent "twilight" condition that he had anticipated.

We must know beforehand as much as possible about the patient coming up for anesthesia. Much of the knowledge which is valuable is to be acquired almost at a glance, and much knowledge so acquired is of very real practical value to the anesthetist. The age, sex and general type; the operation contemplated, with a mental estimate of the length of time its performance will require; a brief study of the laboratory sheet showing the blood, urine analysis and the physical findings on the chart; a careful palpation of the pulse, a blood pressure reading, an auscultation of the heart, a breath holding test; these things, which should form the minimum preliminary examination made by the anesthetist himself, take but a few minutes and give him a very definite idea of the general gross conditions which will influence the anesthesia, and hence the choice of anesthesia.

As an example of what we are trying to put across we should like to recall briefly that our latest three cesarean sections were given three entirely different anesthetics. One was performed for indications known to pre-exist, and, being done at the time of election, was prepared and "worked up." To this patient a nitrous-oxide oxygen-ether anesthesia was given. The next two were emergencies and to one a straight ethylene-oxygen anesthesia was given; to the third a spinal. In each of these cases the choice of anesthesia was left entirely to our judgment, and the selection was made on definite findings and in an effort to meet scientifically the conditions that existed.

Anesthesia is being rapidly developed into a recognized specialty; and that to meet a very definite demand. Wherever medical men or women have really prepared themselves for this service, they have promptly found their services in demand, many giving their whole time to it, and many others only part time. But the point we wish to bring out is this: if nothing more is to be expected of an anesthetist than that he be a skillful technician in the use of two or three inhalation anesthetics, if his judgments and opinions are not sought; if the surgeon tells him what agent to give, and how to give it, then of course he is relegated to the position of a flunkey, as to status, and an automaton as to his work. Anesthesia, scientific anesthesia has never progressed until men really interested in it were encouraged and were made to feel that their work in their profession was worth while. The average surgeon is not interested in the progress of scientific anesthesia. He is interested only in each anesthetic as he operates and judges it altogether by its depth. The latter day anesthetist can bring to this surgeon's clinic selective anesthesia and with it greatly reduced post-anesthetic toxicity and reduced mortality. But cooperation must exist, an understanding by each, of the other's problems, and a spirit of team work.

Let us consider the most obvious contra-indications to anesthesia as understood by the internist, the complications that are usually considered as rendering general, local or regional anesthesia more hazardous. First, cardiac lesions: a valvular lesion giving a murmur, but well compensated, that is, symptomless, readily stands the additional strain, if any, of any general anesthetic that would be chosen. Compensated valvular lesions, regardless of the type of lesion or valves involved, may be safely anesthetized with the gases, or with ether, or with a combination of these. The knowledge of its existence will tend to make the anesthetist watchful and to bring into use those safeguards later to be referred to.

The sole question in valvular heart lesions is the one of compensation and not of type. The decompensated heart offers a real problem when accompanying a surgical condition which is imperative; and, while each is a problem to itself, it may probably be said that the usual case does best under field block and infiltration plus efficient premedication with morphin and scopolamin, morphin in magnesium sulphate, pantopon, and, the evening before and during the night, some of the barbituric acid derivatives.

There must be a safe margin of blood pressure and pulse pressure if spinal is to be considered, and the dilated heart does not usually exhibit this. The chronic myocarditis that follows long in the wake of some acute infection or after one of the more severe exanthemata must be borne in mind. Sudden and surprising deaths, apparently at the heart, have occurred in children who gave a history of diphtheria or scarlet

fever some months previously, but were supposed to be completely well.

High blood pressure does not contra-indicate general anesthesia, practically, though it may be said to do so theoretically. We have, however, seen a patient awaken from an anesthetic with a hemiplegia that did not exist before, and it is easy to imagine that a fatal as well as a non-fatal apoplexy might happen during a narcosis. It would be impossible to say that it might not have occurred at that time anyhow. We believe that a fatal attack of angina might supervene during an anesthesia, especially in the induction stage. We should not be able to attribute the death to this, however, without a history of previous attacks, and with such a history, we should probably not choose an inhalation anesthesia, if any other technic were available.

How shall we safeguard the cardiac cases that must be anesthetized, then? By knowing as much about the heart in advance as is possible, by knowing the patient's history, by avoiding inhalation technics in the decompensated valvular cases, "twilighting" and digitalizing these cases; and in addition, by following the cardiac action throughout the operation by frequent blood pressure readings and, as some of my colleagues like, continuous auscultation.

The second of the gross contra-indications or complications is impaired kidney function. This is solved by the single all inclusive exhortation: stay away from ether, chloroform, and their combinations and mixtures such as anesthol. Use the gases and local and regional agents. The anesthetist who has a patient with acute suppression of urine brought back to him has a perfect alibi if he has given that patient only nitrous oxide or ethylene. His alibi is nearly perfect if he has used a local or regional technic. He is culpable if, with knowledge, or the opportunity to acquire knowledge of a nephritis of any kind, he has used the older pulmonary agents. It is true that the chronic nephritis of the old, characterized by a little albumen and a few hyaline and granular casts, and co-existing with some arteriosclerosis may be considered almost physiological rather than pathological in old age, but we consider old age itself a contra-indication to the lipoid solvent general anesthetics, largely because of this coincident kidney condition.

Third among the major contra-indications to some anesthetic agents are respiratory tract conditions from mechanical obstruction in the upper air passages to inflammatory conditions extending to the alveoli, tracheitis, bronchitis, capillary bronchitis and broncho-pneumonia, lobar pneumonia, lung collapse, empyema. Naturally the irritant agents are logically contra-indicated here; but the gases have their best field, ethylene especially because of the quiet respiration that characterizes it. While nitrous oxide will increase the depth and rate of the respiration, ethylene has little such tendency, if any, and the resemblance of ethylene anesthesia to normal sleep has often been commented upon.

In shock, the last of this group of complications to be touched on briefly, the value and safety of selective anesthesia, as opposed to routine anesthesia is most brilliantly demonstrated; and it may be emphatically stated here that upon the supervention of shock during an operation, the entire management of the condition should pass into the anesthetist's hands. He alone is in a position to diagnose it early and institute treatment. It is within his province now to advocate a speedy termination of the operative procedure; or the abandonment of any part of the contemplated operation that may be abandoned. By frequent readings of the blood pressure he is warned of the onset of shock four or five minutes before it can be clinically diagnosed, and the treatment must be instituted and directed by him. Inasmuch as some anesthetic methods tend within themselves to favor shock or to hamper its treatment, a change of technic or of agents, or both is frequently resorted to. Conditions are met as they arise, and one rule in shock treatment holds good always. As soon as it becomes necessary to combat shock, the first step in the fight is to stop causing it.

You will understand that the foregoing is only a sketch in very broad and general lines of the application of selective anesthesia. No effort could possibly be made in anything smaller than a book, to take up in detail, one by one, specific individual instances of patients, operations and complications. But the fact remains that in many hospitals a routine has been adopted as to anesthesia, regardless almost entirely of complications, contra-indications, and conditions. A toxic goitre is subjected to this routine, just as is a hernioplasty or a dilatation and curettage. The individual, personal, human element is as completely overlooked as are the more practical and obvious physical and pathological phases.

Not all of the generalized recommendations for selective anesthesia may be applied to emergency cases, but the fundamentals can be borne in mind. Laboratory diagnostic findings are usually lacking, and therefore in such cases it were safer to assume the contra-indications that might be shown by laboratory tests, and be, as far as possible, on the safe side.

In conclusion, our conception of selective anesthesia simply means making an individual selection of the anesthetic for each individual surgical patient, in the light of our judgment, our experience, the patient's condition and his operation; our knowledge of the surgeon's methods and demands; and every fact that can be brought out that may help the whole organization or team toward the one single aim of all our combined efforts; which is, the restoration of the patient to health, in the shortest, surest and safest way.

We are aware that our beliefs may be considered too idealistic, and we freely admit that with it all, the unknown elements, the unlooked for in that vague background where the human equation eludes our studies and undoes our best planning, may bring to naught our best intentions; yet we still believe that an ideal should be before us. In an inexact science that deals with human beings, there never comes a time when we can pause and say, "Things as they stand now are as nearly perfect as we will ever get them. We had better let well enough alone."

Francis Building.

SUPRAPUBIC PROSTATECTOMY*

By GEORGE R. LIVERMORE, M.D.,
Memphis, Tenn.

The operation of prostatectomy is far from ideal. On this account men have worked for years trying to devise methods of relieving the obstruction without resorting to this major operation. Workers started with the idea of relieving the obstruction through the urethra. Bottini was the first with his cautery, then came Young with his punch operation, which was improved by Caulk, who added the cautery, then by Collings and Stern with the electrotome and electrotherm, and now by McCarthy with his punch apparatus, by which we can watch every step of the operation as the instrument cuts through the obstructing bar. There are only a few cases in which this operation is suitable, therefore the majority must have more radical procedures. These are the suprapubic and the perineal prostatectomies. It is for the surgeon to decide which of them to use, and it depends upon his training as to which is best for him. We use the suprapubic operation in most instances.

The cause of the enlargement of the prostate is practically unknown, just as is the cause of uterine fibroids. We know they develop, but why we do not know. We know the enlargement takes place at a certain age in men past fifty, and some authorities believe that chronic inflammation is a predisposing cause. In New York they collected statistics in a series of patients to see whether gonorrhea had any bearing, and in 200 cases it was found that those men who had not had gonorrhea had a greater percentage of hypertrophy of the prostate than those who had had it. I think chronic congestion plays some part.

The symptoms begin with frequency of urination and nocturia, and often dysuria. A man will say that he began to get up once at night, then twice, then three times, and had frequency during the day, with failure to empty the bladder successfully, with the result that he would have to make another effort to squeeze out urine, and frequently succeeded.

The most important thing is residual urine, which can be demonstrated by the introduction of a soft rubber catheter, which tells you that the bladder is not completely emptied. Then, with your finger in the rectum, you can demonstrate the enlarged prostate. Unfortunately, however, this is not always present. Often the large prostate grows toward the urethra rather than the rectum.

The diagnosis devolves upon the introduction of a finger into the rectum, the insertion of the soft catheter, and then the cystoscope. There are differences of opinion as to the advantages of cystoscopy. Some say it should be used in all cases, some say only in certain selected cases. Occasionally we come to a case which cannot be cystoscoped. The simple passage of a catheter will frequently bring about a chill, then a return to normal, and again another chill, with all the indications of sepsis. Therefore, before using the cystoscope it is best

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to give the patient some simple urinary antiseptic, such as urotropin, in an attempt to prevent this reaction.

As to operative treatment, I use the suprapubic route in the majority of cases. It is easy enough for anyone to put his finger into the bladder and take out the prostatic gland, but it is not an easy matter to lower the mortality rate, which depends upon careful pre-operative treatment, the scientific removal of the gland and painstaking after-care.

In the pre-operative preparation of the patient every case, regardless of whether you are going to do a suprapubic, a punch or a perineal operation, should have preliminary drainage. This may be carried out by an indwelling catheter or by suprapubic cystostomy. Before the advent of blood chemistry I preferred to do practically all of my cases by the two-step method; to drain them first by suprapubic cystostomy, and then to remove the prostate at a second operation. Since the advent of blood chemistry we know a little more about these patients than before and get them into so much better physical condition that I believe it is better to do a one-step operation if we can. I, therefore, now do principally the one-step operation.

In the drainage of these patients, if there is a large amount of residual urine, it is important that this be very gradually reduced to avoid congestion of the kidney, with uremia or death. Even with a small amount of residual urine there is often risk and therefore it is wise to drain gradually rather than precipitously. Often in the case of a patient with complete retention of urine if one drains off all the urine at one time he will go into coma and die. If a patient has complete retention one should put back into the bladder a quantity of boric acid solution and clamp the catheter, reducing the amount of boric left in each time the bladder is emptied.

High blood pressure is not a contra-indication to prostatectomy, but a varying blood pressure is a very marked contra-indication. If the pressure is 150 one day, 110 the next, 160 on the following day and perhaps 110 again on the next, that patient is a bad risk, for these findings indicate a poor musculature, with myocarditis. Low blood pressure is a contra-indication, and these patients should be stimulated and built up. After operation, a patient who has a low blood pressure with more or less arteriosclerosis, particularly in the kidney, if the blood pressure is not sufficient to drive the blood through the kidney, will die of uremia because of faulty elimination. Low blood pressure also predisposes to hypostatic pneumonia.

By drainage one reduces the size of the prostate. If one has found a large prostate projecting into the bladder, if one drains the patient for a few weeks and then makes another examination, he will find the prostate much smaller. By the drainage you have reduced the congestion and lessened the likelihood of severe hemorrhage. The blood chemistry must be studied to make sure that the case is operable. The nonprotein nitrogen, creatinin and carbon dioxide combining power of the blood are the three things upon which we rely principally. It is also well to know about the blood sugar. The 'phthalein output should be studied to be sure that the greater percentage is excreted in the first hour and that the total output is satisfactory. A small percentage in the first hour and a large percentage in the second hour denotes delayed function, and very frequently, with the patient's resistance reduced by the operation, this delayed function is enough to carry him off.

One symptom I wish to mention is that of a man's going to sleep in his chair in the day time. This frequently is an indication of an over-distended bladder, or a large amount of residual urine and absorption. Often the only symptom he will give is that he urinates very frequently both day and night. He does not suffer, but he goes to sleep in his chair, particularly after lunch or dinner. That is the case you must be very careful about, for that man has a distended bladder or a large amount of residual urine with marked back pressure on the kidneys, and the urine frequently is sterile. If you place a catheter in the man's bladder you reduce the back pressure on the kidney by drawing off the urine suddenly, the heart does not know that this pressure has been relieved and beats with the same force as before, and so causes congestion of the kidneys. Then urethral fever may result and the patient dies because of this sudden relief of pressure or else from sepsis in addition.

One other important point is the appearance of the patient. Oftentimes the carbon dioxide combining power, blood creatinin and the 'phthalein output are good and the general nutrition is good, but the man tires easily and the blood pressure, although not exactly fluctuating, does not remain stable. If he walks up and down stairs he is short of breath and complains of

feeling tired, but the heart and lungs seem all right. Beware of that man, particularly if he goes to sleep in his chair, for these symptoms indicate a flabby heart and arteriosclerosis, not the "come-back" which he should have to withstand an operation. Many complications can occur, all an exaggeration of some one symptom, which are sufficient to take the life of the patient unless he is in very good condition.

We rarely tell a man he is to be operated upon until the morning of the operation. He is given an enema. We use ethylene gas and also synergistic analgesia according to the method of Gwathmey. An hour and a half before operation one-eighth of morphin is given in 2 c. c. 25 per cent magnesium sulphate. Thirty minutes later we give atropin 1/150 and 1/8 morphin in the same solution, and half an hour later another 1/8 grain of morphin in the same solution. We give this deep into the buttock because it is very irritating if injected superficially. He is given glucose and soda 8 ounces per rectum before being taken to the operating room. He has been kept on urotropin up to this time. A sacral anesthetic is given in the operating room. We use sacral and a little ethylene gas. The sacral anesthesia is not 100 per cent certain and it has been my experience that the production of shock is greatly decreased by relieving the patient's apprehension with gas. The idea that they are not going to be hurt helps greatly. Synergistic anesthesia does this, too the ethylene keeps them asleep, and they do not know what is going on. The patient under sacral anesthesia is on edge all the time, thinking he is going to be hurt, for the sacral injection does not block the abdominal wall: but we block it with novocain. The incision is made, the finger is introduced into the bladder in the internal meatus, rupturing the mucous membrane and the capsule and enucleating the enlarged prostate.

The large type of prostate is very easy to shell out, but the small, fibrous type is removed with more difficulty. The hemorrhage is not controlled by looking in and mopping it up and looking again, thus wasting valuable time, for more men kill by chronic surgery than by anything else. If we want to check the hemorrhage quickly, we use the Pilcher bag. If one has only a small bag not large enough to fill the cavity he can use several layers of gauze sutured about the bag. Then sew up the fascia with chromic gut; sew up the skin with silkworm gut, put a drain in the space of Retzius, and put two silkworm sutures through the suprapubic tube. The patient is then given 500 c. c. of saline intravenously. The more water you give these patients the better they do. Do not water-log them, but put it under the skin or into the rectum, and the tissues will take up just what is needed. The patient is always returned to his room well covered up, never being sent through cold halls thinly clad so that he is liable to be chilled and develop pneumonia. He is given glucose and soda every six hours by rectum and the blood pressure is carefully watched. If there is any hemorrhage, transfuse him. Do not wait. It is better to transfuse some patients who do not need it than not to transfuse those who do. Caffein sodio-benzoate is a splendid stimulant and also a diuretic. The position should be changed every two hours to prevent hypostatic pneumonia. Let the bag stay in for forty-eight hours, then remove the bag and the suprapubic tube and leave the suprapubic tube out, but put in a retention catheter for five to seven days.

Two per cent mercurochrome is one of the best things I have found for cleansing the suprapubic wound. It keeps the wound in better condition than anything I know of.

As to the complications and how to prevent them, I think shock is more easily prevented by the methods I have mentioned than by anything else. Use synergistic and sacral anesthesia and just a few whiffs of ethylene gas. The Pilcher bag I consider the best and quickest method for controlling hemorrhage. Formerly it was not large enough, but they now make them larger and, with the ring I have suggested, I think it will answer all purposes. The Pilcher bag, by sealing up the veins, has some tendency to prevent embolism, but it occurs at times regardless of what is done. Failure of the suprapubic wound to close denotes obstruction as a rule in the urethra or at the bladder neck. In order to avoid this we put in a retention catheter after removing the Pilcher bag and pass a sound on the tenth day, again on the seventeenth and weekly thereafter till the suprapubic wound closes. If the bladder wound does not close we cystoscope and sometimes we find a little tag of tissue or small nodule that acts as an obstruction. When this occurs we fulgurate the tag or nodule and remove it. A certain percentage of the cases do not heal regardless of the fact that there is no obstruction in the bladder neck. I have had two such cases. In my opinion this is due to the fact that proper cicatrization cannot take place because of the patient's poor

general condition and excessive scar tissue. We can then go in and remove that scar tissue and suture the bladder fascia and skin separately.

Epididymitis occurs in over 20 per cent of cases according to Randall and our results tallied with his until Goldstein and others called our attention to vas ligation. We do this routinely now and since using it have had only one case of epididymitis. This was so mild that it yielded quickly to support and an ice bag.

OBESITY AND HYPERTENSION*

By Lea A. Riely, M.D.,
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Obesity is one of the commonest and oldest ailments to which human flesh is heir. One has but to read medical history or to see paintings of the great historic characters to verify this fact. Henry VIII became very fat and gouty, as did also Charles V of Spain. Catherine the Great of Russia became so fleshy that she had to be carried around in a wheel chair because she was too fat to walk. All of Reuben's women showed that they had been well fed.

The accumulation of flesh is of extreme importance to the individual as well as to the community, because it decreases the efficiency of living and vastly shortens life expectancy by its parasitism, making the obese individual more vulnerable to the degenerative processes as well as the infectious diseases. Obesity, in a degree worthy of comment, has for some time been appreciated by physicians as a menace to continued health and always leaves a trail of unfortunate complications. It may occur in otherwise perfectly normal people, being the result of the ingestion of an excessive amount of food.

Most fat people like to ascribe their condition to heredity or to some peculiar quirk in their body chemistry or to some mysterious abnormality of their endocrin system; but examination and scientific investigations reveal the fact that the cause in an overwhelming majority of cases lies in their habits of eating. The fact that the fat person actually consumes more energy than he would if he were not obese has been emphasized by Labbe and Sleverin[1] and by Lauter.[2] Observations have been made repeatedly that the basal calories per day lie between 2,000 and 2,200 instead of the normal 1,400 to 1,600. These data lend no support to the conception of a mysterious economy practised by the tissue infiltrated with fat. In other words, obesity is a habit and a dangerous habit at that.

Preble says we are justified in assuming that the basal metabolism in the obese, as a class, is within normal limits and that the ductless glands are rarely an etiological factor. O'Hara, Walker, Vickers[4] and Alvarez in 1924 expressed a belief in what is called a hypertensive diathesis: that certain patients react to strain, mental, physical, or dietetic, in such a way as to develop a decidedly morbid blood pressure. George Draper[3] has tabulated the constitutional characters of the subjects of high blood pressures and chronic nephritis. The males are small with shorter heads than in other disease groups, whereas the females are very large, heavy faced, resembling the type liable to gall bladder disease rather than that of those subject to peptic ulcer, with larger heads than in other disease groups, masculine, and showing physical signs on the lines of acromegaly and previous pituitary activity. Both sexes have the short necks popularly associated with a liability to apoplexy. Hence we have both the "seed" and the "soil."

The power of combustion of food in these people is perfectly normal and the accumulation of fat is the result of over-nutrition only. Barker speaks of this type of obesity as exogenous, to differentiate it from the endogenous types in which there is a diminution in the power of combustion or metabolic rate. While exogenous obesity is often a family characteristic, the gluttonous habits are possibly the main factor to contend with. The lack of temperance in eating, is with the lack of temperance in drinking, is ultimately judged alike by the cold, impartial and scientific eye of the pathologist. And whether St. Peter will condone one with more favorable or charitable decision, or send the other to the deepest limbo, is a matter which no one can answer. A comparatively slight disproportion between fuel intake and combustion may in a few years result in this high grade of obesity. Thus van Noorden calculates that an excess of but 200 calories a day will in the course of a year lead to a gain in weight of twenty-four pounds. Indeed, the extraordinary

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thing is not that so many persons become obese, but rather that more do not (James H. Means).

The accumulation of wealth in our Country which permits of repeated Lucullian feasts, the fact that the per capita consumption of sugar has increased from 10 to 110 pounds per annum in less than a century, and the development of a leisure class, are the chief factors in the production of obesity, and are making of our people a race of hypertensives and diabetics. These factors are also made possible by the increased longevity bringing them into an age of life where these troubles are more common. As Joslin has facetiously put it,

"The doctors have saved the people from a sudden death of earlier years and condemned them to a more lingering one in past middle life."

Now, obesity is assumed when one weighs above an ideal weight, and that ideal is measured by age and height as gleaned from the tables accepted by our insurance companies after weighing and measuring several thousand people, both male and female, in order to find an average. In the exogenous fat person the flesh is uniform in its distribution. The face is round, the neck short, with a double chin, the arms and thighs are broad and round and in extreme cases the masses of fat form folds. The chest may be deep and the breast in the female very large. The waist may be very large and the abdomen pendulous, folding over the thighs. The buttock may be very big, hanging over the back part of the thigh.

Hence we see that the exogenous obesity is an increased tax upon their metabolic and eliminative functions which sooner or later show evidence of wear and tear, while the endogenous or endocrin obesity is less prone to such evidence.

We do not know what is the universal pressor substance that causes an increase in the arterial tension of these individuals, but we do know that the incidence of hypertension is greater. We know that these people show a blood sugar curve after a sugar tolerance test that simulates the curve in the diabetic. We know, too, that most of these people are potential diabetics. We find after management of these patients along the lines of dieting compiled on their ideal weight and the loss of some of this weight possibly to that of their ideal weight, that the blood sugar curve comes down to normal, as also does the blood pressure in a case of simple hypertension. Hypertension, then, is really a compensatory or conservative process wherein the heart tends to keep the pressure within these various organs at a height where they can function against a greatly increased peripheral resistance. This is more in the group where there is a fixation of the arterial tree at a narrowed caliber in the sclerotic process from long resultant strain. Hence, management of arterial hypertension should be almost entirely prophylactic in its detection at the earliest possible time to prevent all those disastrous results which accompany irreducible hypertension. For at this time intelligent efforts at removal of causes of arterial hypertension will be rewarded with a definite fall in blood pressure through vasodilation without the slightest disturbance in the circulation; while if the arterial tree is found fixed through arterial sclerosis or through irremovability of vasoconstrictor influences, then no harm can be done, because in these conditions no fall in blood pressure could ever be obtained.

Aschoff calls attention to the feeding experiments in rabbits by which the administration of cholesterin over long periods of time led to arteriosclerosis. With its withdrawal the atheromatosis disappeared. He says: "Thus in this instance it is in fact a reversible process." We know that fleshy people are more subject to atheromatous processes in their arterial tree, and we know that atheromatous processes are a dominant Mendelian trait, but the fundamental condition underlying is in the metabolic process which certainly causes it.

We know that fat metabolism goes on abnormally so far as cholesterol is concerned both in the diabetic and in the obese and it stands to reason that the closer we keep the weight to the lower limits of normal, the safer it will be for the patient.

While Joslin[5] shows the parallelism between the vessel changes in the two conditions, he observes there must be some difference because the diabetic usually has degenerative processes in the extremities, producing a gangrene from other causes, while in the obese the coronary arteries and cerebral or even kidney arteries are the ones that bear the brunt and cerebral, aginal or uremic crises are the common modes of exit. The rise in blood pressure may come on very slowly and insidiously as in Allbutt's case, where it extended over a period of nineteen years, or it may come on very rapidly and even go down without any obvious reason. Arteriosclerosis occurs because of constant stress and strain

CASE ONE

J. B. P.—52
Father—drowned.
Mother d. 59, Nephritis.

Pertussis at 36. Typhoid at 18, sick for 3 months. "Flu" in Feb. and March, 1927. Kicked in head by mule at 7 yrs. old and fractured skull. Chews food poorly because of absence of back teeth.

Cold sweats from knees down, unable to concentrate mind on business, short breath on exertion, dizzy, headaches especially at base of brain, has given up business because of head symptoms. Nocturia 2 X. Eyesight presbyopic. No edema ankles, face bloated on arising, dermographia and urticarial weals. No "pep", gets very hot in bed at night, redness of forearm after taking B. P.

Av. wt. 235, Max. wt. 245. Jan. 1927,
Present wt. 240, Ht. 6 feet.
Estimated wt. 182, (82 kilos) at .7 gm. protein per kilos equal 60 grams protein per diem.

Date	B. P.	Wt.	Remarks
11-11-27	210/115	240	
11-29-27	180/100	226	Head clearing
12-16-17	180/100	222	Back to business
1- 3-28	160/ 80	217	No nocturia.
1- 9-28	155/ 90	215	
1-18-28	170/ 90	214	
1-28-28	165/110	210½	
3-19-28	155/ 90	201	
4-27-28	155/ 90	200	
7- 3-28	150/ 90	193½	Attending to business as usual

brought on by increased pressure. The anatomic findings in the hypertensive variety of arteriosclerosis do not differ from those in other types: they are decresent and infectious or toxic, except that the muscular layers are apt to show a greater degree of hypertrophy.

Virchow's inhibition theory of arteriosclerosis, so named and modified by Aschoff, may or may not be the correct theory, but it certainly fits in with the conditions found in obesity and diabetes, and whether it is a pressor substance or not its presence is a sure source of danger to its host.

"We know that fat metabolism goes on abnormally so far as cholesterol is concerned both in the diabetic and in the obese, and it stands to reason that the closer we keep the weight to the lower limits of normal, the safer it will be for the patient. Second, the diabetic or the obese who has seemed to me to develop arteriosclerosis at an abnormally early age, has been the severe diabetic kept alive hitherto on a low-carbohydrate high-fat diet."

Protein is a food which is not well borne by either the normal body or the damaged kidney because, when given in excess of the physiological needs of 1 gm. per kilogram it tends to produce arteriosclerosis and has a pressor substance in some of its end products such as guanidin, as was brought out by Major. The trouble with our former concepts of protein feeding was that we gave the patient such a small amount as to produce a proteid starvation which in itself was hard to overcome. It produced anemia and other symptoms of deficiency diseases. The profession is no longer guilty of such errors.

Carbohydrates, when taken in such quantities as to produce obesity, are not a cause of hypertension except in those predisposed.

Aubertin, in the *Presse Medical* August 23, 1922, compares the blood pressure record in 70 obese persons, mostly bed-ridden for years in an institution, and 20 from private practice not bedridden, all with the same obesity index. The blood pressure was normal in 10.1 per cent in the first group, and 62.5 per cent of the second. The blood pressure was very high in 43.3 per cent of the institutional group and moderately high in 46 per cent. His conclusions were that the sedentary life, the poorly balanced excessive carbohydrates ration and mild drinking habits cooperate in the institution to induce both obesity and hypertension, but only in the predisposed. Others having the same conditions in every respect do not develop obesity and their blood pressure remains normal.

Kidney disease and arteriosclerosis cannot always be incriminated. They are found among those with renal blood pressure and no obesity as often as in the obese. He rejects completely the assumption that obesity in itself can cause high blood pressure, but he warns that their frequent coincidence imposes the necessity for taking the blood pressure of the obese. A permanent high blood pressure may escape detection unless directly sought for, the disturbances, therefore, being ascribed to the obesity. Apoplexy and sudden death for which the obesity

CASE ONE-A

Nov. 28, 1927.

	60 Protein	1620 Calories
Mr. Pitts—Diet ordered by Dr. Riely		
DIET FOR ONE DAY		
3 large servings of fresh fruit or fruit canned without too much sugar	3	300
8 heaving tablespoons of vegetables. (No corn, lima beans, baked beans, potatoes)	4	75
50 grams of lean cooked meat	12.5	120
3 Eggs or equivalents:	18	225
1 Egg—3 strips crisp bacon		
1 Egg—2 heaping tablespoons cottage cheese.		
3 Glasses Whole Milk	18	450
1½ Slices bread—Whole wheat or Graham, best	4.5	150
Butter, 2 squares		200
Coffee—Cream, 2 Tablespoons. No sugar		100

CASE ONE-B
EXAMPLE OF A DIET FOR ONE DAY

BREAKFAST

½ Grapefruit
2 Soft Boiled Eggs
½ Whole Wheat Toast with half square butter.
Glass of Whole Milk
2 Tablespoons of Coffee—Cream
Kaffee Hag—No sugar.

DINNER

50 grams of Lean Cooked Meat
Spinach
Beets
Head Lettuce Salad with Mineral Oil Dressing.
Pear
½ Whole Wheat Bread with and square Butter.
Glass of Skimmed Milk.

SUPPER

Cream of pea soup (Made from milk)
String Beans
Baked Squash
Tomato and Cottage Cheese Salad with Mineral Oil Dressing
Baked Apple
2 Soda Crackers—half square of Butter.
½ Glass of Milk.

had been held responsible are in reality due to the high blood pressure and this is within our control to a certain extent.

A. H. Terry (*J.A.M.A.*, October 13, 1923), said that cases referred to his clinic for obesity were found to have high blood pressure in 37 of the 63 patients, or 58 per cent. The familiar diagnosis in the majority of cases was obesity and hypertension.

I notice that in the catalogue of the Graduate School in Philadelphia the subjects of diabetes, obesity and hypertension are covered by one of the chairs above.

The method used for correction of obesity has been to calculate the correct diet for the ideal weight, or whatever weight is desired. The treatment, different from that of diabetes, has been to give more than enough protein to keep the patient in nitrogen equilibrium: one gram of protein per kilogram of body weight is given, because in the treatment of obesity the specific dynamic action of protein probably was desirable. With a gram of protein per kilogram enough carbohydrate and fats were calculated to give 25 calories per kilogram of that weight. The carbohydrate and fat were in such proportion that the ketogenic-anti-ketogenic ratio was 1.5 to 1.

After the figures for protein fat and carbohydrate having been obtained, the menu was made up to fit the figures for protein and carbohydrate, and as much as possible of the fat was omitted while allowing the patient the desired amount of protein.

Evans,[6] in some of his cases, gave as low as 600 to 650 calories total intake, which was equivalent to six calories per kilo actual weight.

The maximum possible ketogenic-anti-ketogenic ratio, according to Woodyatt's formula, may be estimated by assuming that the entire caloric deficit is supplied by fat alone and that the stored fat metabolizes in the same manner as the fat in the diet. The possibility of the development of acidosis on this diet does not appear to be great. In fact, all patients had acetone in their urine at first, sometimes for weeks, but were still enthusiastic in their expression of well being.

The patients have not had disasters or misfortunes which were due to another cause than the dietary. The hemoglobin and red cell count have either remained the same or increased. They have not shown floating kidney, splanchnoptosis, hernia, or, if varicose veins were present, anything but improvement in them.

Tuberculosis would be a contra-indication. Patients with myocardial lesions are supposed to be poor subjects for reduction, but some of these with definite evidence of myocardial damage and a few with symptoms such as dyspnea, swelling of the feet, and palpitation suggesting minor grades of myocardial insufficiency, were dieted exactly like the others and the results were most

CASE TWO

C. R. S. Age 51
F. d. Apoplexy 87, wt. 200 lbs.
M. d. Apoplexy 75, wt. 260 lbs.
6 Brothers living and all above 180 lbs.
1 B. 6 feet, weighs 250 lbs.
1 B. 65 paralytic.
4 S. 1 and w.

Medical History essentially negative.
Ht. 5′ 6″, max. wt. 237 year ago. Present wt. 220. Est. wt. 153. Pains in chest over heart and shooting down arms to elbow, last 5 minutes with sequelae, not related to eating or exercise. No sequela except slightly dizzy on walking. Nocturia 0. Constipation 0. Digestion good. Color rather swarthy, and has dark circles around eyes at times. Bilious temperament, big eater. No murmurs or adventitious sounds about heart or lungs. Radials not torturous or beaded, no Corrigan pulse.

Date	B. P.	Wt.	Remarks
4-18-24	190/60	220	
5- 3-25	190/60	192	
10- 6-25	190/60	184½	Pain under l shoulder kept him awake 2 nts.
3-25-28	175/40	181	Feeling fine, no anginal pain.
5-15-28	170/40	180½	
7- 2-28	170/50	177½	
9-21-28	190/60	180	
9-22-28	170/60	180	Lost 40 lbs. Anginal pains gone.

CASE THREE

J. A. H. Age 38. Married, 6′ 2″.
F. l. & w. 200 lbs.
M. l. & w. 170 lbs.
6 B. l. & w. wt. 150 to 200

Max. wt. 235 in 1916. Av. wt. 225.
Present wt. 227. Est. wt. 192.

Pneumonia complicating measles 1907 and quite sick. Enlarged tonsils which are red and red pillars of fauces. Tonsillitis 2 wks. prior which lasted 7 days, confined to house but 4 days. Dermographia +++, dizziness +, belches +, flatulence +++, constipation 0.
April 1, 1928, heart developed most irregular irregularity, pulse deficit or circus movement, but upon use of quinidine sulphate grs. v. every 3 hrs. 20 grs. established the regular rhythm and has maintained it until this day. Subjective symptoms, marked nervousness, dyspnea. April 17, 1928, Tonsillectomy under local.

Date	B. P.		Remarks
4- 1-28	180/110	227	
5- 3-28	150/110	217	Tonsillectomy.
5- 7-28		214	
5-12-28		213	
5-17-28		212	
6-13-28	150/100	209½	
8-10-28	145/ 95	205	Feels good and says most improvement within last month. Traveling over state as an insurance general agent.

gratifying. A study of nitrogen balance in these cases showed the patient in positive nitrogen equilibrium.

Before dieting, a large number of these patients complained of headaches which were so severe at times as to suggest migrain. In every one remarkable relief was obtained. A

CASE FOUR

Date	B. P.	Weight	Remarks
9- 6-27	210/140	322	Nervous, Dizzy,
9-14-27		311	Dermographia
9-17-27		309	
9-27-27	200/125	300½	No nocturia or vertigo.
10-7 -27		297	
10- 8-27		295	
10-10-27	190/110	295	
10-11-27		294	
10-12-27		292	
10-15-27	185/110	290	Lost 34 lbs. in 6 wks.
10-24-27		289	dieting.
10-25-27		288	
10-29-27		282	Not dizzy, back at bus-
11- 5-27		284	iness, does not fatigue
11-21-27		278	so easily. Maximum
12-10-27	180/110	273	loss 49 lbs.
		• • • •	
1-23-28	210/140	283	Christmas holidays
1-25-28		278	caused gain.
1-26-28		278	
2- 4-28		278	
2- 9-28	200/140		Ate sausage and had
2-10-28	190/140	277	headache yesterday.
2-21-28	250/140		Had stroke affecting rt. arm and leg and
3-21-28	250/140	266	speech.
3-28-28		264	
4- 5-28	230/140		
4-30-28	255/140	265	
5-21-28	245/130	263	
6-11-28		257	Total exodontia.
7- 9-28		255	
8- 9-28	225/120	256	
8-27-28		260	

dull heavy feeling in the head was complained of by many before treatment. Dizziness and confusion of thoughts incapacitated them from carrying on their usual vocations and were the chief symptoms when they presented themselves for treatment. Dermographia was also a most constant symptom and showed that some metabolic toxin was a menace to health and efficiency.

Case 1.—After thorough hospital study with blood chemistry, Mosenthal, phenolsulphonephthalein test and routine urine examination, the patient's case was diagnosed essential hypertension and obesity. He was put on the following diet (see pages 159 and 160) and took his meals at the hospital, where he could be held on the certain prescribed diet as ordered (A). (B) shows menu for one day.

Case 2.—The case is one of a group described by Landis, with big pulse pressure, although he lost weight. There was much improvement of his subjective symptoms, yet the blood pressure did not materially change. Arteriosclerosis was causing the change. (Page 160.)

Case 3.—This shows obesity, hypertension, focal infection and marked cardiac arrhythemia which marvelously improved. Focal infection was removed and the weight reduced. (Page 161.)

Case 4.—Study of this case showed 35 per cent phenolsulphonephthalein in two hours. No change in blood chemical findings, but he had nocturia, and the urine specific gravity varied only 5 points. He lost 34 pounds on dieting and 30 points in systolic and diastolic pressure, but dietary excesses at Christmas time undid the beneficial work and later the pressure went higher than ever, remaining fixed after a cerebral crisis with hemiplegia following muscular strain, hence it had gone beyond a point where a "reversionary" process was possible, even with a total of 62 pounds at last blood pressure reading. (Opposite column.)

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CLINICAL APPLICATION OF URINARY ANTISEPSIS*

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The quest for specifics goes forward without interruption. It is but natural that every effort

*Read in Section on Urology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

possible should be made to find and apply the most efficient agents in the combat against infection. The problem of urinary antisepsis has received no small measure of attention from investigators during the past decade. And although the urologist is particularly interested in bacteriuria, the general practitioner is equally confronted, almost daily, with evidence of bacterial invasion of the urinary tract and should be just as anxious to have at his disposal therapeutic agents that will effectively retard the process.

It is quite universally understood today that there exists an intimate relationship between urinary infection and certain accessory factors in genito-urinary pathology, chief of which are: (a) urinary stasis; (b) calculus; (c) new growth; and (d) trauma. Obviously, where either one or any combination of these four factors enters, antiseptics by mouth, to the exclusion of all other established modes of treatment, will result in failure. Where anato-pathological states complicate urinary tract infections, oral therapy can serve only as an adjunct. Where such defects are absent, much can be achieved by the administration of the newer internal urinary antiseptics alone.

Foci of infection outside the urinary tract not infrequently perpetuate certain types of pyelonephritis, ureteritis, cystitis and prostatitis. These foci must receive attention before success can be attained in combating the urogenital condition. The focal infection theory is not a myth. Anyone who has seen intractable urinary disorders clear promptly following the removal of badly diseased tonsils, teeth or appendices cannot deny the fact that focal infections play an important role in medicine.

The introduction of certain synthetic dye preparations furnishes us with a more tangible form of therapy, for workers in chemotherapy have added much to our knowledge concerning the selective properties of bacteria toward certain chemical substances. Selective bacteriostasis is a term commonly met now in chemotherapeutic literature. By selective bacteriostasis is meant "the use for a given infection of an antiseptic known to have a selective affinity for the particular organism responsible for the infection."

The introduction by Churchman of gentian violet; of acriflavine by Browning; Young's presentation of mercurochrome; the advent of hexylresorcinol sponsored by Leonard; and, the discovery of pyridium by Ostromislensky furnish us ample proof of the onward march of chemotherapy in its effort to stem the tide of bacterial invasion in the urinary tract. Certainly with such an array of drugs already at our command, it is only proper that the profession should avail itself of these agents in daily practice, report their findings and, in time, properly evaluate each individual preparation as to its selective bacteriostasis or at least a determination of the relative antiseptic properties which each dye substance possesses.

The more deeply I delve into this problem of bacterial invasion of the urogenital apparatus, the more convinced I become of the effectiveness of these newer synthetic dye antiseptics. By oral administration alone most promising results have been observed. I am aware of the fact that intravenous therapy is much in vogue at the present time and that many of these synthetic dyes are being administered with pleasing results. In the urological service of the Southern Baptist Hospital probably more intravenous dye therapy is practised than in any other hospital of the far South. There is a place for intravenous therapy. But in this communication I desire to limit the discussion to the oral administration of the newer urinary antiseptics. Furthermore, we shall mention only those drugs that have been in use in our Clinic.

Mercurochrome.—The oral administration of mercurochrome, like that of gentian violet, has received little attention. There is only one contribution, that of Young, Scott and Hill, on mercurochrome given by mouth. No work other than our own, so far as we know, has been done with gentian violet by mouth.

Mercurochrome orally in doses of three 0.1 gm. enteric coated tablets three times a day has an influence on bacterial growth in the urine. Such a dose will produce from a 1:12,000 to a 1:50,000 dilution. The stools will be stained deep red in patients taking mercurochrome by mouth. It is an efficient intestinal antiseptic and because of the fact that many urinary infections are due to intestinal stasis with accompanying infection, the mercurochrome serves a double purpose. Gentian violet in doses of 65 mgs. when given three times a day, by mouth, stains the stools a deep violet. The objection we have to both mercurochrome and gentian violet in the form in which they are at present administered is that they invariably produce gastro-intestinal upsets of such degree as to preclude their wide application. Loss of appetite, nausea, vomiting, intestinal colic and diarrhea are symptoms distressing to the patients which, if continued, will soon cause them

to refuse further to take the drug. However, because of their pleasing effect in intestinal infections, I trust the objectionable features of both dyes will soon be obviated.

Neutral Acriflavine.—In contrast to the original substance, acriflavine, described by Browning, neutral acriflavine is an acid-free product, is neutral in reaction and can be used in higher concentrations than the original flavine. From a chemical standpoint this dye is diaminomethyl acridinium chlorid. Its use as an internal urinary antiseptic was first suggested by Davis. When it is administered in doses of 0.1 gm. daily, in enteric coated tablets, the urine is stained decidedly yellow. Antiseptic action begins within two hours after it is administered and persists for at least eight hours. Its action is more pronounced where the urine is alkaline. For this reason sodium bicarbonate is usually prescribed along with the neutral acriflavine. It has not proven of any value in our Clinic in the treatment of gonorrhea, but in kidney and bladder infections due to bacilli or cocci it has materially aided in clearing the urine in about half of the cases so treated. In the other half, it had no effect. Unfortunately, few patients can take it for any period of time because of the nausea it produces. Even with bicarbonate of soda this nausea cannot be abated. Future experimentation in the chemical laboratory may produce a preparation less irritating on the gastric and intestinal mucosa.

Hexylresorcinol.—This product of synthetic chemistry is the normal hexyl derivative of resorcinol. It is claimed to merit a high degree of bactericidal power and is supposed to be relatively non-toxic. The crystalline substance is marketed in capsules containing 0.15 gm. of the drug in a 25 per cent solution of olive oil. Our early experiments were confined to the bulk olive oil solution and used in children (a teaspoonful every four hours; each dram containing 0.1 gm. of the drug). Later, we used the capsules, beginning with two after each meal and increasing later to four capsules after each meal. In no instance was the drug continued longer than ten days if it appeared to be a total failure for that period. It was adopted as a rule in this study that if no results were forthcoming within ten days, no matter what drug was being tested, it was not the remedy we were seeking. Patients as well as physicians are entitled to results. If the remedy is without effect, both become discouraged. In all cases the urine was checked by me personally every day. A count of the pus cells and bacteria in the stained sediment were noted. Invariably the difference was so slight, from day to day, that hexylresorcinol was discontinued in our Clinic as being unsuitable for our needs.

Pyridium.—Four outstanding characteristics are claimed for a semi-colloidal condensation product of the beta and gamma isomers of phenyl-azo-alpha-alpha-diamino-pyridine hydrochlorid, namely: its marked power of stimulation to the proliferation of epithelial cells, its powerful bactericidal action, its ability to penetrate the tissues and its rapid elimination through the genito-urinary tract. The drug has received the trade name of pyridium.

Pyridium, when ingested *per os* in 0.2 gm. doses, appears in the urine in forty-five minutes to one hour and remains in decreasing concentration up to twelve hours. The average dose of pyridium per day is 0.6 gm. Presuming that the patient excretes 3,000 c. c. of urine each day, and we know from experimentation that pyridium is excreted almost *in toto* by the urinary tract, this would give a concentration of approximately 1:4,500, which is too dilute for efficient action. Therefore, the patient is asked to limit his fluid intake to 1,500 c. c. per twenty-four hours, which will give a concentration of 1:2,000, or within the maximum therapeutic range of the drug.

While taking the drug the color of the urine may resemble any tinge in the yellow spectrum from an orange yellow to a garnet. In concentrations of 1:1,000 pyridium will kill staphylococci and streptococci in forty to fifty minutes *in vitro*. There is no question that pyridium inhibits bacterial growth in the urinary tract, even in the face of anatomical defects. There is no irritation experienced by the patient voiding a urine containing pyridium, as is the case with some other of the dye antiseptics. On the contrary, its action upon the mucosa seems soothing in the dilutions usually obtained. We find it desirable to give pyridium a few days prior to operations on the urogenital apparatus for its prophylactic effect.

As with every therapeutic means we have at our disposal, the drug has its limitations. In pyelonephritis of pregnancy, where there is a tendency to gastro-intestinal disturbances, care should be taken in the prescribing of pyridium. In severe hepatitis, where excretion is slow, it is reasonable to assume that the drug must be absorbed by the somatic cells or be taken up by hepatic epithelium, as it is very slow to

TABLE 1
RESULTS OF PYRIDIUM THERAPY

Case	Sex	Age	Organism	Complications	Duration of Disease	Length of Medication	Results
1	F	48	B. Coli	Pyelonephritis	5 yrs.	7 mo.	Good
2	F	28	B. Coli; Cocci; Gon	Gonococcal Cystitis; Endocervicitis	3 mo.	3 mo.	Good
3	F	54	Staph	Strictured Ureters	2 yrs.	2 weeks	No infection in three weeks
4	M	65	Cocci	Prostatitis, Chronic	15 yrs.	2 mo.	Good
5	F	9	Cocci; Staph	Hydronephrosis	4 yrs.	2 mo.	Excellent
6	F	30	Coli	Urethral Caruncle; Cystitis	1 yr.	3 weeks	Good
7	F	49	B. Coli	Pyonephrosis	4 yrs.	7 mo.	No better
8	M	33	B. Coli	Pyelonephritis	3 yrs.	7 mo.	Good
9	F	22	Gonococci	Cystitis; Urethritis; Cervicitis	1 yr.	1 mo.	Excellent
10	F	55	B. Coli	Papilloma Urethra	10 mo.	6 mo.	Excellent
11	F	57	B. Coli	Cystitis Urethral Stricture	2 yrs.	——	Unable to tolerate Pyridium
12	F	20	Gonococci	Cystitis; Urethritis; Endocervitis	8 mo.	4 weeks	Good
13	M	77	Gonococci	Acute Gonococcal Urethritis	1 day	6 weeks	Excellent
14	M	61	Mixed Infection	Nephritis; Chronic Prostatitis	5 yrs.	6 weeks	Died unimproved
15	M	25	Gonococci	Urethritis; Prostatitis	1 week	2 mo.	Excellent
16	M	33	Gonococci	Prostatitis	1 mo.	1 mo.	Excellent
17	M	65	Mixed Infection	Prostatitis	2 yrs.	4 mo.	Good
18	M	43	Gonococci	Prostatitis	1 mo.	3 weeks	Good
19	F	45	B. Coli	Cystitis; Stricture	3 mo. ?	3 mo.	Good
20	M	27	Gonococci	Urethritis; Prostatitis	1 mo.	6 weeks	Excellent
21	M	38	Gonococci	Urethritis	3 weeks	2 weeks	Fair
22	M	32	Gonococci	Prostatitis	1 yr.	1 mo.	Good
23	F	62	B. Coli	Cystocele; Cystitis	5 yrs.	4 mo.	Unimproved
24	M	49	Mixed Infection	Prostatitis; Chorine Bi-Pyelonephritis	4 weeks	1 mo.	Excellent
25	M	33	Gonococci	Prostatitis	8 mo.	6 weeks	Good

present itself in the urine of these patients, and I believe should not be given. Some patients with chronic parenchymatous nephritis, especially those having a low 'phthalein output, should not be given pyridium. Some cases present marked idiosyncrasy to pyridium and will not tolerate the smallest doses.

Pyridium stains the feces little, if any. However, the secretion obtained by massage of the prostate and seminal vesicles shows a uniform yellow tinge. It is the first dye antiseptic we have ever used in which the prostatic and vesicular secretions were stained uniformly in every case.

The prompt effect this drug exerts upon bacterial growth in urinary tract infections, as well as in those in contiguous structures, must be seen to be appreciated. Unless the investigator will personally check the urine daily by microscopic study of stained sediment smears he cannot evaluate the worth of the agent he is using. Invariably prompt improvement in the urine is noted within twenty-four hours. This improvement was so pronounced as to arouse enthusiasm from the very start. Never, in my eighteen years of urological practice, have I seen any drug act upon bacteriuria so promptly and so effectively as pyridium. Whereas bacilli and cocci are retarded from the very first dose of the drug, it is in gonococcal infections that pyridium seems to have a real selective action. In acute gonorrhea, it is a most valued adjunct, the most effective we have at present.

The table compiled by my associate, Dr. R. M. Willoughby, shows what was accomplished in fifty cases selected from a series of over two hundred. In this chart practically every type of case is represented that the practitioner meets with in daily practice.

All patients were given two tablets, three times a day, after meals. Instructions to drink as little water as is compatible with comfort were given all in order to maintain a fair concentration. Within ten days the improvement has usually reached a stage where the dose can be reduced to one tablet three times a day continuously or two tablets three times a day only three days in each week. If no improvement

TABLE 1 (Continued)
RESULTS OF PYRIDUM THERAPY

Case	Sex	Age	Organism	Complications	Duration of Disease	Length of Medication	Results
26	M	24	Gonococci	Prostatitis	2 mo.	2 mo.	Good
27	M	19	Gonococci	Epididymitis; Prostatitis	1 yr.	3 mo.	Excellent
28	M	24	Gonococci	Urethritis	2 wks.	8 weeks	Excellent
29	M	34	Gonococci	Urethritis; Prostatitis (This patient had a hypospadias with many large urethral diverticula.)	1 week	3 mo.	Poor
30	M	22	Gonococci	Urethritis	2 weeks	8 weeks	Excellent
31	M	30	Gonococci	Cowperitis; Prostatitis; Urethritis; Para-urethritis	5 yrs.	5 mo.	Slightly improved
32	M	40	Non- Specific	Urethritis	5 days	1 week	Well
33	F	40	Cocci	Cystitis; Cystocele; Rectocele	5 mo.?	3 weeks	Improved
34	F	28	B. Coli	One Kidney— Left Pyonephrosis	3 yrs.	5 mo.	Improved
35	F	51	B. Coli	Chro. Cholecystitis Right Pyelonephritis (This patient improved rapidly after Cholecystectomy.)	3 mo.	2 mo.	Good
36	F	30	B. Coli	Bilateral Pyelonephritis	4 weeks	1 mo.	Good
37	F	22	B. Coli	Rt. Pyonephrosis	1 mo.	6 weeks	Good
38	M	44	B. Coli; Cocci	Calculi Left Renal Cortex; Lt. Pyelonephritis	3 yrs.	3 mo.	Good
39	M	28	Gonococci	Urethritis; Paraurethitis Prostatitis; Periurethritis	1 week	3 mo.	Improved
40	F	36	Mixed	Ureteral Stricture Rt. 200 cc stasis	2 yrs.	4 mo.	Excellent
41	M	43	Cocci	Prostatitis	6 mo.	5 mo.	Excellent
42	M	35	Gonococci	Urethritis	1 week	8 weeks	Excellent
43	M	47	B. Coli	Lt. Pyelonephritis; Prostatitis; Seminal Vesiculitis	1 yr.	8 mo.	Good
44	F	35	B. Coli	Pyelonephritis of Pregnancy	4 weeks	5 weeks	Good
45	M	23	Gonococci	Urethritis	4 days	6 weeks	Excellent
46	F	44	B. Coli	Rt. Ureteral Stricture	5 mo.	6 mo.	Good
47	M	23	Gonococci	Secondary Syphilis; Acute Gon. Urethritis	2 days	8 weeks	Excellent
48	F	59	B. Coli	Urethral Stricture; Cystocele; Chr. Cystitis	5 yrs.	2 mo.	Improved
49	F	53	B. Coli	Rt. Pyelonephritis	1 mo.	3 weeks	Good
50	M	68	Mixed	Adenoma Prostate; Acute Prostatitis	2 weeks?	8 mo.	Good

whatever is observed within ten days, it is useless to continue the therapy. Usually some extreme pathologic abnormality accounts for failure. Here, cystoscopy and urography reveal conditions plainly beyond the aid of chemotherapy.

In conclusion, I would only reiterate the fact that it appears, from present indications, that the introduction of the chemotherapeutic dye preparations heralds a new epoch in urinary antisepsis. Much clinical research and experimentation still remains to be done before dyes with specific bacterial affinity prove beyond peradventure of doubt their superiority. The beginning has been most auspicious. It behooves clinicians to familiarize themselves with these newer chemotherapeutic agents and to apply them rigorously in order that a sane therapy, in combating urinary infections, may be established.

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DISCUSSION (*Abstract*)

Dr. Edgar G. Ballenger, Atlanta, Ga.—This subject is important from two standpoints: first, in regard to the value, or lack of value, of the urinary antiseptics; and second, in regard to the indications for the use of those of proven value.

It is fortunate for at least some of the patients that the urinary antiseptics are of no greater value, for the obvious reason that if they were 100 per cent perfect many patients with obstructions, new growths or other lesions, would have the inflammatory part of the condition controlled to such an extent that a correct diagnosis might be delayed thereby until obstructions might have seriously damaged the kidneys, until benign growths became malignant, or until malignant growths had extended beyond the hope of even a fair chance of eradication.

The extensive employment of effective urinary antiseptics would tend to make the general practitioner

and patient regard the freedom from pus and bacteria as perhaps sufficient evidence of improvement to render unnecessary the diagnostic measures which at times are required for the correct management of pyuria and bacteriuria. Pus, blood and bacteria in urine are indications for a search for the source and the cause of these evidences of disease. When, however, it is known that the obstructions, new growths, calculi and diverticula mentioned by Dr. Walther do not exist, and when such predisposing factors have been eliminated, urinary antiseptics become of value. They are of value also in certain conditions where the acuteness of the process precludes the investigations necessary for diagnosis.

The extensive exploitation of urinary antiseptics should not be allowed to beguile physicians and patients into a false sense of security. Proper treatment is so dependent upon a correct diagnosis that the advocacy of the use of antiseptics over long periods of time, regardless of whether the pus and bacteria decrease, and regardless of the cost or gastro-intestinal and other disturbances, should not be permitted.

Our experience with pyridium coincides, in part, with that of Dr. Walther. About the only cases, however, in which pyridium is employed by us with more than the usual hope of beneficial results are those in which cocci, not bacilli, are predominant. This does not include gonococci, which have not yielded as have staphylococci. Our results with colon bacilli rarely have been encouraging, except at times in mixed infections.

We get a better absorption of pyridium tablets if the coating is punctured or broken. Unless this is done they frequently pass through this body unabsorbed. Women sometimes have irritation of the vulva following the administration of pyridium. It is advisable to have them carefully wipe away any drops of urine to prevent this irritation.

Urotropin not infrequently has afforded prompt, though often temporary, results in clearing bacilluria. Rarely have we seen improvement from the use of acriflavin, gentian violet or mercurochrome by mouth. The last mentioned remedy, however, has not been employed by us sufficiently often in this manner to justify the expression of an opinion as to its value.

Dr. T. M. Davis, Greenville, S. C.—I believe that the use of urinary antiseptics by oral administration will be more or less discontinued as time goes on unless more efficient antiseptics are discovered. My results from oral administration of the ones we have at the present time have been disappointing. There is one drug, neo-arsphenamin, which, when given intravenously in cases infected with gram-positive micro-organisms, gives almost miraculous results. This is what we should strive to accomplish with another drug for cases infected with gram-negative micro-organisms. I have treated eighty odd cases in the past two years with neo-arsphenamin with uniformly successful results. Urinary abnormality, such as stricture, kinks, stones or prostatic hypertrophies, must be corrected for permanent results. Spectacular results will be noted within twelve hours following the administration of neo-arsphenamin. You may have fulminating cases of staphylococcus and streptococcus infection with high fever and pain, relieved within twelve hours, and in some instances within twenty-four hours the urine will be sterile. This drug is a urinary antiseptic and no other equals it.

Dr. A. Mattes, New Orleans, La.—Dr. Walther has stressed the value of many drugs, and you will find that each of the drugs he has mentioned in certain cases will give a spectacular result, and will encourage you to use it in other cases, in which you will have no result. I have found pyridium of great advantage in the acute, fulminating, posterior gonorrheal infections. Large doses over a period of several days, with hot soaks, will give the patients more benefit than anything else I know of. The gram-positive infections, particularly the staphylococcic, whether aureus, alba or citreus, are greatly benefited by the administration of arsenicals by mouth. It is very surprising to see these clear up within a few days under the use of stovarsol or some such proprietary preparation. It is not necessary to use neo-arsphenamin intravenously. It must be remembered that this is not infallible. All these drugs do good if there is no mechanical factor present in the urinary tract contributing to the infection and maintaining its presence, but the indications for all of them are extremely limited.

ELECTRO-THERAPEUTICS IN MODERN OTO-LARYNGOLOGY*

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The modern oto-laryngologist should have a thorough knowledge of electro-therapeutics. If he will apply this art in his practice, he will render better service to his patients.

The specialist's office of forty years ago was litered with electrical appliances, some of which were junk, but he accomplished marvelous results for his day with the galvanic current. Later the modern hospital-trained specialist cast aside all of the electrical appliances, for his training was surgical. The pendulum is returning to the center, and the well equipped office of today has a roentgen-ray machine, a galvanic wall plate with d'Arsonval attachments, a combined water and air-cooled ultra-violet machine, and one or more infra-red lamps.

Galvanic.—Galvanic, the oldest in usage of our currents, is used to stimulate nerves and muscles. It is a constant current, employed for galvanism, electrolysis and cataphoresis. The two poles of its batteries are the negative (cathode) and the positive (anode), the current flowing within the battery from the negative to the positive, while outside it continues its cycle to flow from the positive to the negative. The positive pole is sedative in its effect, acid in reaction, and because of its vasoconstrictor action will stop hemorrhage. The negative pole is stimulating, alkaline in reaction, and because of its vasodilator quality will increase hemorrhage. Metals are positive in their electrical

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

charge and, therefore, are expelled by the positive pole and attracted by the negative pole. With this knowledge, we can see the rationale of zinc ionization in the treatment of chronic otorrhea. Zinc ionization will not replace surgery, but when non-surgical treatment is to be used, it has proven in our hands to be the most satisfactory therapeutic measure at our disposal. The method used, being a physical reaction, will depend for its success upon having the zinc solution come into direct contact with the pathological area. If the disease is limited to the middle ear and there is a sufficiently large perforation to allow the zinc solution to enter the middle ear and bathe the diseased membranes, the treatment will be successful. Otherwise, it is foolish to try it. The technic of zinc ionization in chronic otitis media is as follows: cleanse the canal and middle ear of all secretion and dead tissue. With the diseased ear lying uppermost the middle ear and canal are filled with a zinc solution (zinc sulphate grain 1 to an ounce of distilled water). The zinc being positive will be attracted by the negative pole, which is placed at a distance away from the ear. The cathodal electrode should be large so as not to concentrate the current. A small piece of metallic zinc is attached to the positive pole to be expelled in ionized form. This electrode must be well insulated and be in the zinc solution. When the current is turned on the zinc is converted into positive ions which, by the process of electrolysis, will migrate toward the negative electrode. In its cataphoresis (passage through the body) the zinc penetrates the diseased aural membrane and a maximum therapeutic action is obtained. The treatment should be repeated twice a week and in a month's time should show results or be discontinued. The age of the patient is important, as cooperation is necessary to obtain a result. Infants can be held still by force for the fifteen minutes of treatment, but older children who will not lie still are bad subjects for this form of therapy.

Galvanic treatment of paresis of the various cranial nerves is satisfactory when the nerve can be reached by the current. The effect of the cathodal closing will serve as a tonic to any one of the cranial nerves and can be demonstrated to reproduce the special function of the nerve. Unfortunately, it was exploited as a treatment for optic atrophy, but the hopelessness of any result here is evident.

Galvanism cannot be replaced in the treatment of facial paralysis, whether it is to cure the idiopathic type or to prevent atrophy of the facial muscles in the traumatic type. I have had splendid results in the treatment of the former type with this current in conjunction with catheterization of the eustachian tube.

The technic I use is to stimulate the nerve by cathodal closing with as strong a current as the patient will tolerate with comfort. The various branches of the nerve are treated several times. This is followed by a weaker current for five minutes, using the anodal electrode over the exit of the nerve from the mastoid process.

In the treatment of nerve deafness, we have a sensible procedure in galvanism instead of nasal operations and eustachian catheterization. There are a number of tinnitus cases which are given relief by stimulating the auditory nerve. The toxic vertigo patients can be made comfortable by stimulating the less active labyrinth. The galvanic current can also be used to test the excitability of the vestibular branch of the auditory nerve in contrast to the labyrinth when there is a doubt as to the location of a lesion.

The tinnitus cases which are most frequently helped are those in which there is a marked response to the current. I have produced a tinnitus in some cases which passed away without any harmful results.

The technic of auditory nerve treatment is the same for its two branches. The external auditory canal is packed with cotton moistened with a salt solution. The contact with this cotton plug is made by having a large wet cotton pad over the auricle. The cathodal electrode is attached to this pad and the anodal electrode held to the opposite mastoid so that the current will penetrate the petrous portion of the temporal bone.

The majority of cases of hoarseness are not due to lesions of the vocal cords, but are functional, the intrinsic muscles of the larynx failing to contract equally because of their spasmodic condition. This may be seen in simple catarrhal laryngitis and is always present in hoarseness following shouting. The proper application of galvanism will release these muscles, and I have seen a decided change of the voice in a few hours after such a treatment. The paralysis of the palate and pharynx are amenable to galvanism and its use in post-diphtheritic paralysis will hasten a cure.

Faradism.—A faradic current is an alternating current and is seldom used in oto-laryngology. The older otologists tried with it to shake loose the ossicles when they were fixed by adhe-

sions. Their efforts met with failure. The faradic current is most active upon muscles and is used to treat the facial muscles during a paralysis of the seventh cranial nerve. D'Arsonval modified the faradic current and produced his d'Arsonval current and diathermy. The former is used in the treatment of muscles and the latter will be considered separately.

Rays.—When the sun rays are passed through a prism they are broken up into the spectrum. Today we use the infra-red light as a sedative when heat is desired for that purpose. The violet and ultra-violet rays are used as a stimulant. The general radiation of the body with ultra-violet will accomplish in a shorter period the same results as sun rays, and ultra-violet radiation is available at all times throughout the year. The general value of the rays is for the activation of the provitamins and the control of the calcium within the blood and tissues. It is a wonderful tonic and will increase the leukocytes of the blood. Ultra-violet from the water-cooled apparatus can be concentrated for local application by the use of quartz rods. I have found it of great value in the treatment of the vasomotor rhinitis and to prevent excessive granulations in post-operative ethmoid, sphenoid and mastoid cases. The late use of the rays in the nares after a pansinus operation cannot be equalled by any other measure which I have so far tried, as the periodical use of the rays intranasally stimulates the membranes and keeps them comfortable. It is also of value in many of the skin lesions about the nose and ears. The direct application of the rays to an acute tonsillitis will serve the same purpose as a caustic. The inflamed tissues will tolerate rays better than normal tissues and require longer exposure. The dentists have utilized this treatment for pyorrhea, but with little success.

Roentgen Ray.—I will not include the diagnostic value of the roentgen ray, but consider it as a therapeutic measure. Its use is for destruction, not so rapid as surgical diathermy, but gradual and deep. The younger the cell the more susceptible to the ray will be the tissue it forms. Likewise the closer the tube is to the tissue the greater is the concentration of the dose. Lymphoid tissue is very susceptible, and hence the use of the x-ray against obnoxious lymph nodes or adventitious lymphoid patches. It has some effect on the bones of the sinus and the mastoid, but its best use is to destroy lymphoid tissue. Its employment to remove tonsils has proven so uncertain that it must be condemned. I have dried chronic discharging ears with roentgen therapy, but attribute its success here to its action on the lymphoid tissue of the nose, pharynx and eustachian tubes.

Diathermy.—Diathermy is administered by a modified faradic current of high frequency which, during its passage through tissue, produces heat. This heat varies from a mild warmth to a coagulation of tissue, depending upon the current and the relative size and position of the electrodes. The smaller the electrode the more concentrated is the heat. The value of this heat is that you can, by arranging the electrodes, produce its maximum in any part of the body desired. We tried with failure medical diathermy in the treatment of mastoiditis. It caused many of the suppurative cases to necrose and require immediate operation.

In the treatment of sinusitis our experience was better, for the heat gave physical relief without the rapid production of pus. Surgical diathermy can be substituted for cold steel with the advantage of less bleeding. The cut area is coagulated, thus preventing the spreading of malignant tissues or infection. It is ideal for block dissection of cervical glands suspected of malignancy and for opening purulent infections about the nose. Carbuncles, when opened by surgical diathermy, heal with little reaction and the remaining scar is less objectionable than that usually seen after surgery. In the removal of tonsils I think that surgical diathermy has been a failure, though some surgeons use it when operating upon bleeders.

DISCUSSION (*Abstract*)

Dr. R. O. Reaves, Knoxville, Tenn.—It gives me great pleasure to endorse most of what Dr. Shea has said in regard to electro-therapeutics in oto-laryngology. I have been using zinc ionization for chronic otorrhea for the past few months. My success has been very gratifying. Some cases clear up on one treatment, and most of them within four treatments. With this treatment I see my cases about once a week, whereas I formerly saw them about every day for ten days. It is simple and takes little of the otologist's time. I would like to add one point which Dr. Shea did not mention and that is that we should make intermittent pressure on the tragus, asking the patient to swallow at the same time, after we have filled the canal with the solution. This forces the solution into the recesses and the eustachian tube, which will be sterilized by the process.

I have not tried the galvanic current in the treatment of nerve deafness. If this will give relief to tinnitus, it certainly should be a boon to some patients.

I use electric current to stimulate the facial nerve in Bell's palsy, beginning in the second week. I think it is advisable to use the heat rays at once. In my last five cases I have applied ultra-violet rays to the tip

of the mastoid, producing secondary erythema. Two of these cases began to clear up immediately and were soon well.

Heat, light and ultra-violet ray therapy are of much interest to me. The solar rays are the prime mover of civilization. There is no growth without light or without vitamins which have been stored up in food exposed to light. Rays have the power to give or destroy life. Why should we not give them a close study to find their therapeutic value? In May, 1924, a water-cooled quartz lamp was left with me on a thirty days' trial. The improvement which I saw in my post-operative sinus cases forced me to buy the lamp. The use of the ultra-violet rays has practically done away with secondary operation to clear up the field of post-operative granulations.

I use the carbon arc lamp for general irradiation and believe it is superior to the mercury vapor for this purpose. The mercury lamp is rich in ultra-violet and poor in the rest of the spectrum, while the carbon arc gives ultra-violet, light and heat like a natural sun bath. Ergosterol, an impurity found in cholestorol, in the skin is activated to become vitamin D when exposed to the ultra-violet rays. Ultra-violet rays produce a photo-chemical change when absorbed by the skin. Light and infra-red rays produce heat when absorbed by the body tissues. The infra-red rays are great pain relievers. They increase the temperature and cause a greater flow of blood through the exposed part, thereby improving the nutrition and bringing the antibodies in greater numbers to fight the infection. We have been told by the manufacturer that infra-red rays are the penetrating rays.

The work of Dr. Carl Sonne, of Copenhagen, Denmark, has shown that the longest infra-red rays are very superficial and that the penetrating power increases as the rays shorten toward the visible spectrum and that visible (light) rays are more penetrating and will increase the temperature at a greater depth than infra-red rays. He has also shown that the infra-red ray will produce a higher temperature on the surface than the luminous rays will. Hence, infra-red rays are better for corneal ulcers.

All is not known about diathermia as yet. Dr. C. O. Cottle, of Chicago, experimenting on dogs, has shown that you cannot increase brain temperature with diathermia. The same is true of the lung. The current passes through the more dense tissue.

Roentgen rays are indispensable to the up-to-date oto-laryngologist.

GRAFTS AFTER EXENTERATION OF CONTENTS OF ORBIT*

By CECIL H. BAGLEY, M.D.,
Baltimore, Md.

In all cases where the eye is to be enucleated it is desirable to form a stump that will give the most natural appearance to the artificial shell. If the eye alone is enucleated, leaving behind Tenon's capsule and the other orbital soft parts, the problem is relatively simple. Many substances have been inserted into Tenon's capsule (in order to replace the enucleated eye) such as silver wire, silver, glass, platinum and gold balls, ivory, enamel, hard rubber, gauze, formalized bone, burned out bone, fat, fascia, paraffin, spheres of elderberry or sunflower pith, and last of all, cartilage. Cartilage has been used both in the form of formalized calf's cartilage or the cartilage taken directly from the sixth rib of the patient, as reported in the *American Journal of Ophthalmology*, December, 1926.

The advantages of using endogenous cartilage are:

(1) It furnishes a rigid supporting stump, giving motion to the artificial eye.

(2) It avoids the introduction of a foreign body, a fundamental surgical principle.

(3) It is a non-irritating substance.

(4) When endogenous grafts are used the necessity for blood matching is eliminated.

(5) It replaces the enucleated eye by a closely related substance, namely, a living graft, which should last as long as the patient lives.

After complete evisceration of the orbit for malignant tumors, or other conditions, the problem is very different. Here we are dealing with a large cavity lined with the exposed bony wall of the orbit, from which a graft cannot obtain sufficient circulation. If these orbits are not reconstructed with some living material the lids become contracted and virtually disappear, leaving a large aperture exposing the entire orbit. Needless to say, this is a great drawback from the standpoint of physiognomy, and a great source of irritation to the patient, as these cavities are constantly accumulating foreign material.

The post-operative procedure after evisceration of the orbit has been handled in many ways by different surgeons. Some prefer to make no attempt at reconstruction, merely having the patient wear a black patch or ground glass mounted in his spectacles. Others have attempted to remove the conjunctiva from the posterior surface of the lids and, suturing them together, to construct an epithelial lining for the orbit. This naturally leaves a large depression. Others have attempted to epithelialize the cavity by Thiersch graft, but, the circulation being poor and the accumulation of secretions great,

*Clinic, General Clinical Session, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Fig. 1

these grafts frequently perish. Should they live, there is still a large cavity remaining in which an artificial eye cannot be successfully worn.

Full thickness skin grafts have also been attempted. It is apparent from the standpoint of surgery that a graft large enough to fill an eviscerated orbit must be made under at least the two following conditions:

(1) The bony wall of the orbit must be covered with granulation tissue, as grafts will not grow on exposed bone. Halsted solved this problem in skull grafts by drilling holes through the outer table of the skull. These holes were drilled about 0.5 cm. apart over the area to be grafted. Shortly after this, granulation tissue developed from the marrow cavity and gradually covered the exposed area. Thus he was able to place Riverdan grafts from some hairy portion of the body on the granulation tissue with excellent results.

(2) When a thick graft is used, such as one large enough to fill an orbital cavity, it is essential to maintain its circulation until it has established a new connection with the orbital granulations. Following this principle, pedicle grafts, including skin and subcutaneous tissue, have been taken from the temple, the side of the face and the neck with very good results, but leaving facial scars which are at times unsightly.

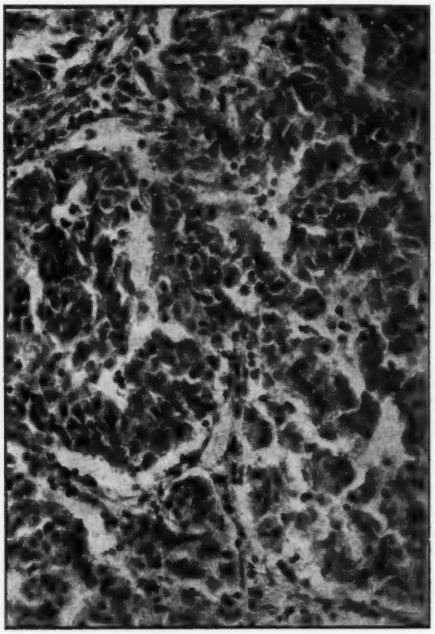

Fig. 2

An attempt has been made to reconstruct these orbits by delayed skin subcutaneous tissue and muscle grafts from the upper arm.

Fig. 3

Fig. 4

On December 6, 1926, a complete exenteration of the left orbit for sarcoma was performed by Dr. Wilmer on a young girl aged twenty-four (*Fig. 1*). External canthotomy was done, the conjunctiva being divided at the bases of the cul-de-sacs above and below. The section was carried down to the orbital brim. The tumor was not encountered anywhere along this line of dissection. The operator then dissected the soft parts free from the bony orbital wall, removing the periosteum with the orbital contents. The dissection was carried up to the apex of the orbit, where the optic nerve and the ophthalmic vessels were clamped and divided. After the eye with its tumor and all the orbital soft parts had been removed there was a perfectly smooth bony surface, which was carefully examined, but did not show any tumor involvement (*Fig. 2.*) (Microscopic diagnosis was non-pigmented sarcoma of choroid with perforation of sclera and invasion of the orbital soft parts.) When the bony oozing had been checked with bone wax the cavity was filled with gutta-percha and packed tightly with plain gauze. Radium was inserted beneath the lids. The external canthotomy and the lids were then sutured together and a dressing applied. The patient was dressed daily and made an uneventful recovery.

After the fourth day following operation the orbit was kept tightly packed with Dakin's gauze. This prevented infection, and on the tenth day granulation tissue began to appear around the orbital sutures. The Dakin's gauze dressings were continued and the granular cells spread until the entire orbital wall was covered by a thin, healthy layer of firm granulation tissue. In an attempt to safeguard the patient from recurrence of the tumor, a very heavy dose of radium was administered at the time of operation, which promptly destroyed the upper and lower lashes, which have never shown any signs of regeneration (*Fig. 3*).

On January 31, 1927, Dr. Wilmer advised filling the orbital cavity with a delayed graft from the left arm. The upper arm from the shoulder to the elbow was thoroughly cleansed with benzine, alcohol and ether and painted with 3.5 per cent iodin. The skin around the lids was cleansed with green soap, irrigated with boric acid solution and painted with mercurochrome. After carefully measuring the size of the graft needed to fill the orbital cavity, the measurements were transferred to the inner surface of the upper arm with brilliant green. An incision was made through the skin, subcutaneous tissue, fascia and biceps muscle, leaving the pedicle of the graft toward the shoulder. The wound from which the graft was raised was then slightly undercut and closed easily with black silk sutures at the pedicle of the graft. The outer canthus was divided, thus giving ready access to the orbital cavity. The arm was placed in a semi-flexed position over the head and held there by an assistant. The distal end of the graft was then carried through the divided external canthus and carefully inserted in the orbit without pressure. This immediately filled out the depression under the upper and lower lids, the subcutaneous fat of the graft being completely obscured by its cutaneous portion, which was carefully approximated to the conjunctiva of the under surface of the lids at the bony orbital brim with fine black silk suture. Thus the cul-de-sacs were reconstructed both above and below, and once more the cavity was completely lined by epithelium. Silver foil dressing was then applied and the entire head, chest and upper arm included in a plaster cast, a window being cut around the wound to facilitate dressing.

On February 9, 1927, the pedicle was divided and carefully fitted beneath the outer canthus, which was then closed, thus restoring the normal contour of the lids (*Fig. 4*). The silver foil dressing was replaced and following this the circulation of the graft was found to be quite sufficient.

On March 5, 1927, a temporary artificial shell was inserted, which unfortunately was a bit large, as seen in *Fig. 5*. Careful general examination was made, including x-rays to rule out any possibility of recurrence of the tumor.

Conclusions.—Pedicle grafts, including skin, subcutaneous tissue and muscle, can be taken

Fig. 5

from the upper arm to reconstruct the eviscerated orbit after the exposed orbital bone has been covered by healthy granulation tissue. The promotion of these granulations can be affected by the free use of Dakin's solution, which acts as a mild antiseptic and produces the desired firm granular layer from which the orbital graft derives its circulation after its pedicle has been divided.

There are two distinct advantages in using grafts taken from the upper arm.

(1) The patient is saved unsightly scars which sometimes result when the grafts are taken from the head or neck.

(2) Any quantity of material, including muscle, can be obtained, thus allowing the full correction of the defect left by the removal of the orbital contents.

JOHN GEORGE ADAMI: AN APPRECIATION*

By GEORGE B. ADAMS, B.S., M.D., F.A.C.P.,
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In the rapid progress of modern medicine, when much is being done to prevent disease, and much to care properly for the sick and afflicted, when satisfying results are being obtained, we sometimes find ourselves observing the accomplishments of our profession with more or less pride. While we may boast of the great achievements of our profession in this day, we need only look over the pages of not very distant history to find the deeds and works of the pioneers of present-day progressive medicine, the greatness of which cannot be measured for generations yet to come.

In our desire and effort to do the greatest good to the greatest number, I can do no better than point to the way of those who have laid the foundation on which medicine today stands and grows.

In pointing to those who have gone before us, I have selected the name of John George Adami that I might tell you something of his life, his character and his work, for there is much in it worth while.

*Chairman's Address, Section on Pathology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

He was originally of Italian descent, an Englishman by birth, a Canadian by adoption, and, we might say, an American in its broadest sense, for the influence of his work as a teacher, lecturer and writer has been felt in every part of the continent and still carries on. He was born on January 12, in the year 1862, at Manchester, the fifth child in the family, and was given the same Christian name as his father. His mother, Sarah Ann Ellis Leech, daughter of Thomas Leech, of Urneston, Lancashire, was a sister of Dr. Daniel John Leech (1840-1900), Professor of Materia Medica and Therapeutics in Victoria University. Adami's ancestors were

John George Adami
1862-1926

for several generations medical men, though his father was not a physician.

He was educated in the Manchester grammar school and Owens College. In 1880, at the age of eighteen, armed with a scholarship, he entered Christ's College, Cambridge. Having come from Owens College, he seemed to most of the boys, who had come from grammar schools, rather grown up and mature. Hence, he readily became a leader among them. From the first, he took an interest in the activities of the place. He spoke at college debates and sometimes at the Union. He was a frequent contributor to the college magazine.

He soon showed his interest in things scientific. He took the natural science tripos and made firsts in both parts, and was the Darwin prizeman in his year. At the close of his first year he was elected a member of the exclusive University Natural Sciences Club, a select club composed of twelve undergraduate members chosen from all the colleges in Cambridge. During his time at Cambridge an unusual number of men were in residence, who later made their names known throughout the biological world, and among these Adami took a high place.

In Cambridge, along with other fellow students, he came under the influence of Frank Balfour, the youngest brother of the statesman. Balfour, in the field of biology, stimulated his students to do more work than most teachers are capable of doing. The students spent much of their spare time working in his laboratory; hence, Adami took no leading part in athletics during his college career. Throughout his life he was never known to take a personal interest in sports of any kind, except rather superficially. However, he was ever an advocate of the principle of training the body along with the mind and so encouraged his students that they might have a sound body in which to develop a sound and active mind.

The untimely death of Balfour in an Alpine accident was a great loss to biology in Cambridge. But the loss to Cambridge in the passing of Balfour probably gave us Adami in pathology, for he was deeply interested in biology, and, with the continued influence of Balfour, it is not unlikely that biology, rather than medicine and pathology, would have been his chosen field.

In his college life he was always bright, cheerful and hospitable, both in his college rooms and at home. It was not uncommon to find his friends about him, and many of them spent part of their vacation in his father's home. Here we find, in its development, that characteristic so prominent in his life, the magnetism that attracts men of all kinds about him that they might learn by the association and gain inspiration from his ever-active life.

After finishing four years at Cambridge with distinction, he went abroad in 1884, visiting the more important schools and laboratories on the continent. In Paris he worked with Roux, in Breslau with Heidenhan. In the laboratory of the latter he made a second study of the circulation of the frog's kidney and later wrote on its clinical bearings.

He returned to Manchester, where he did his clinical work under the guidance of his uncle, Dr. D. J. Leech, and later was house physician to the Manchester Royal Infirmary. Following this, he returned to Cambridge as demonstrator of pathology. Here he carried out research work in comparative pathology under Michael Foster and Charles Smart Roy, and established himself as a coming man. At first he interested himself in a variety of minor things, a fact which was an evidence of his curious mind.

Roy was a brilliant, but erratic, genius who was building up a school of pathology. Adami's natural bent for physiology fitted in well with the experimental outlook in pathology which Roy had learned from Cohnheim, and the two turned out the important piece of work on the heart and circulation which resulted in their memoir in 1893, which, as you know, is a classic.

In the latter part of the eighties there were two incidents in the life of Adami interesting and worth relating. It seems that the quarters or rooms supplied for the school of pathology were small and inadequate; however, they were the best the University could provide. But, still worse, the great possibility of fire in the department was ever present. Because of this and as a precaution, the Secretary of the Museum Syndicate, while on the way to his work, made a practice of passing through the department every day to keep a lookout for such dangers. One day, while passing through, he found all the laboratory boys and the under-porter trying to capture a monkey that had escaped and that was gibbering from the highest point he could reach in the room. Three hours later, when passing the laboratory, he heard two of the young pathologists talking and one of them said, "Perfectly typical pustules." He at once interrupted them and asked if they referred to the monkey. And the young fellows related, with great enthusiasm, the story of the monkey's having been inoculated with smallpox and that it was the first instance known of a monkey's having "taken." The Secretary then said:

"Well, that monkey has got to be killed and soaked in corrosive sublimate and cremated before I leave this place."

Of course, this met with objections, but he insisted that it be done because of the strong feeling in the town against vivisection, further assuring them that if the monkey should escape

into the town (as he almost did) it would be difficult to imagine how much harm might be done or how many people might become infected, with great damage and discredit brought upon the University. All who had been in the room with the monkey were vaccinated at once, but, in spite of this, the under-porter developed typical smallpox ten days later.

The second incident was as follows: in 1889 Adami had a most unpleasant experience, the description of which is given in the following paragraphs quoted from an article by Arthur Everett Shipley:

"In the summer of 1889 a mysterious disease broke out among the deer in the Marquis of Bristol's park at Ickworth. The pathological department at Cambridge was called in to investigate the outbreak. At first the authorities put it down as anthrax, and if I remember aright the Board of Agriculture scheduled it as such. At that time it was not known that deer could suffer from rabies, and I was not only startled but thoroughly alarmed when one evening Roy came to my rooms and said he was convinced that the disorder was rabies and that his demonstrator, my close college friend, had sliced his hand when cutting through the medulla of a deer's brain preparatory to removing that organ. Now, the medulla oblongata is the most virulent seat of infection in rabies. Roy was also thoroughly alarmed. He had made my friend start for the Pasteur Institute by the night train and had had so much to do to get him off in time that he had not been able to warn me. He now asked me to leave for Paris by the next boat and, after informing myself of what the symptoms of the disorder were, I left.

"Paris was glitteringly hot; it blazed heat, and having exhausted the exhibition, or more truly the exhibition having exhausted us, there was little to do and we spent many hours in the swimming baths on the Seine trying to persuade ourselves that they were the coolest places in the city. Of course we never talked about why we were there and except during the morning visit to rue Vaugirard entirely ignored the subject. The last two days of our stay I began to think I saw symptoms appearing which corresponded with those Roy had described. I tried to persuade myself that I was unduly nervous; if so, I became more nervous the day we crossed. I wanted to accompany my friend to his home in the North, but he begged me not to. None of our people knew why he had been to Paris and he was most anxious that his family should remain in ignorance. So we went our several ways. Two days later he wrote that he was perfectly well, but as the Duke of Wellington said about the battle of Waterloo, 'It was a damned near thing.' In the train going North he found he could not swallow. On reaching home he went to bed, fell into a deep sleep, and slept for thirty hours on end and his folks had the sense not to disturb him. On the second day he awoke with all the depression and malaise gone, perfectly well."

Throughout this experience Adami showed the greatest courage, as was true of his attitude toward himself even in his last illness. He was never given to complaining and while truly a sick man in the early summer of 1926, he attended the meeting of the universities of the British Empire and later, at Nottingham, he attended the meeting of the British Medical Association, and at both meetings took part in the discussions. Unwilling, to the last, to surrender to the ills of the flesh, he was still doing his part toward the dissemination of knowledge for the betterment of mankind.

Adami received his M.A. degree from Cambridge in 1888 and his M.B. in 1889. In 1890, he was appointed John Lucas Walker student in pathology and continued his experimental work and brought out a number of papers. He worked for a while in the Pasteur Institute, but returned to Cambridge on being elected a fellow of Jesus College.

He entered Cambridge in 1880 and received his M.D. degree in 1892. During these twelve years he prepared himself thoroughly for the field he had chosen as his life work. He had gone deeply into the mysteries of the cell and had learned much of its life, and he had observed with an inquiring mind the problem of heredity. That he was well prepared is ably borne out by his accomplishments in subsequent years at McGill University and, finally, at the University of Liverpool.

Adami was just thirty years old in 1892 when he accepted the chair as Strathcona Professor of Pathology and Bacteriology at McGill University. He was considered young to hold so important a post at McGill; yet his appointment had been preceded by many years' work in some of the best laboratories in England, France and Germany, where he had given his time chiefly to the sciences: biology, physiology, pathology, bacteriology and allied subjects bearing on medicine. He had already established himself in the field of research and experimental medicine by his work on the heart and circulation. So, filled with the enthusiasm and ambition acquired from his professors, C. S. Roy and Michael Foster, he brought with him not only the traditions of Cambridge, the great physiological center of the time, but a wide range of knowledge gained through the opportunities and associations which it had been his privilege to enjoy in England and on the continent. His arrival at McGill marked a new development in the University and stimulated afresh the desire for experimental medicine. He immediately began to make a name for himself by his clear and thorough methods of presenting his subject, both in class room and laboratory, and by his manner of dealing

with the simple and advanced thoughts in his field, as well as by his general outlook upon scientific education.

Canada was not behind in the field of science, for Ramsay Wright and A. B. Macallum had done much pioneer work in the biological sciences, work that was far-reaching in its results. Wyatt Johnston had urged the growing importance of research in pathology and bacteriology and had done some interesting work on diphtheria and typhoid. His contributions to medico-legal science were among the best on the continent.

Yet, until the arrival of Adami, there had been little, if any, organized effort to promote interest in these subjects in the universities of Canada; nor had adequate facilities been provided to maintain in McGill a pathological department in keeping with its importance. On the occasion of his inaugural address, Adami dwelt on the "Renaissance of Scientific Medicine" and, while he was addressing the teaching staff and students, he was adroitly drawing to the attention of the governors of the University and the hospitals the crying need of more facilities for this kind of work, lest Canada should fall behind in the great effort of civilization to discover the prevention and cure of disease. And so it was in a short period of time that McGill opened up its Molson pathological laboratories and its modern wing in the Royal Victoria Hospital for the study and teaching of pathology and bacteriology.

With new and well-equipped laboratories Adami soon had a band of enthusiastic workers carrying forward research on many problems, and from these came a continuous stream of papers dealing with many branches of pathology and its application to other sciences. His laboratory was truly the Mecca for a variety of students, both young and old, not only pathologists, but practitioners, chemists, physiologists, and even industrial leaders, all seeking advice, suggestions and the inspiration which they found in a recognized authority.

At this time and resulting from the inspiration he had brought to McGill, the Lister Club was established, the purpose of which was to encourage interest in scientific medicine in its broadest sense. Membership in the club was open to members of the staff in all laboratories.

Adami, being full of energy, interested himself in activities outside this university connection. He took a notable part in the fight against tuberculosis in Canada and, on one occasion, while discussing tuberculosis in cattle, he said:

"Canada, our Canada, should stand before the whole world as the first country to solve this great problem and to possess stock wholly free from this devastating disease, so ruinous to agricultural communities throughout the world."

He was President of the Canadian Association for the Prevention of Tuberculosis, 1909-12.

He was interested in problems of public health both in Montreal and throughout Canada, in child welfare and civic improvements of all kinds, in education, in culture and the fine arts. He was adjudged a connoisseur of music and paintings, and one time wrote an anthem, "Lighten Our Darkness." So, we find his activities extending far beyond the university life.

The knowledge of the worth of this man did not long remain within the confines of his laboratory, or even among his associates of McGill University. His fame soon spread abroad and, as a lecturer, he became very popular. He was a much-sought-after speaker by various organizations and institutions throughout Canada and the United States.

To his lectures or addresses he never went unprepared; hence, they were always inspiring and suggestive. He was an extensive reader, being well informed on all worth-while literature in his field. In fact, his knowledge of the literature was a source of amazement to his colleagues. Therefore, it was not difficult to arouse and maintain the interest of his audience, whether it was his class in the University, a scientific body, or a lay audience.

Adami was truly a cultured and widely read man with a fair knowledge of foreign languages. Throughout his life he contributed to various publications, his subjects ranging from Pictou cattle disease to classification of tumors. He was a prolific writer, and he always wrote in a lucid style. In the by-paths of his subjects he showed an unusual depth of learning and he had the power of expressing his knowledge and of presenting abstruse problems in a manner that added value to his publications. His approach to every subject is comparable with that of Osler. A recognition and appreciation of his ability was clearly manifest when he was invited to contribute the opening chapter in Allbutt's "System of Medicine," using as his subject, inflammation. His article here on inflammation, writ-

ten when immunity was an almost new and independent science, bears ample testimony to the breadth of his conception. One can but feel that he appreciated in the phenomena of inflammation the key to the fundamental science of pathology. He even expressed himself in these words:

"For the development of the sound pathologist, a full knowledge of the factors concerned in the inflammatory process and a right appreciation of the doctrine of inflammation is as essential as to the orthodox theologian is a right attitude in respect to the doctrine of the Trinity."

This article was appreciated at once as one of authority. It was revised and appeared in handbook form, passing through four editions, and today it is one of the classics in medical lore.

Following the appearance of this monograph, "Inflammation," he produced, along similar lines, his greatest work, "Principles of Pathology," in two comprehensive volumes: the first on general pathology in 1909, and the second dealing with special pathology, in which he was assisted by Dr. A. G. Nicholls, in 1910. This work met with such a cordial reception that a second edition was published in 1910 and 1911. The extent and depth of these two volumes give ample evidence of the vastness of his knowledge. He had a high conception of what a textbook on pathology should be. In the preface to the first volume we find this expression:

"Classification alone is not science; at most it is the implied recognition that like phenomena are due to like causes, whereas science, fully developed, is the discovery and study of the laws or principles governing the production of phenomena, and thus underlying and determining classification. What is needed in a textbook of pathology is not the mere record and description of phenomena, but the attempt to analyze these phenomena in an orderly manner."

Many acclaimed this text the best English compendium of general pathology that had yet appeared.

He wrote freely on evolution, and in 1924 wrote on the "Unity of Faith and Science." He gave the Middleton Goldsmith lectures before the pathological society of New York in 1896 on the relationship between inflammation and sundry forms of fibrosis. He also gave the Croonian lectures, in 1917, before the Royal College of Physicians of London, discussing the problems of adaptation and disease. He found much delight in his historical and biographical essays, such as "The Edinburgh Tradition" (1900), "A Great Teacher (Sir Michael Foster) and His Influence," and "Sir John Harrington," and "Sir William Osler."

Adami had high ideals as to the duties and obligations of a medical man and, in teaching his students or on the lecture platform he was frequently found expressing these ideals in a manner suiting the occasion. On the occasion of laying the corner stone of the new medical building at the University of Michigan, Ann Arbor, 1902, in an address on the "Art of Healing and the Science of Medicine," he expressed this thought:

"No profession demands from its followers the more constant exercise of practical Christianity than yours—dating back centuries to the school of Salerno, and yet earlier, that the call of the sick and afflicted is to be attended to, and to be attended to with no second thought. To this extent, the exercise of your profession is pure religion."

Again, in an address to the graduating class of McGill, April 4, 1895, we find this thought:

"One thing may, I trow, be taken for granted, namely: that you have selected your profession for higher motives than that of making a livelihood; if you have not, then of all men you are to be pitied.

"Not only is your time not your own, but each case that presents itself demands honest thought and the fullest endeavour on your part to put forth all that you possess, irrespective of what the monetary result is to be. Love for the work is and must be first. This may be an instinct wholly unassociated at first with any idea of doing good, but the very liking and desire to engage in the work must lead you to seek every opportunity of practice and so, willingly or unwillingly, the good is done."

At the outbreak of the World War, Adami enthusiastically and unreservedly gave his services to his country. He was given a temporary commission as Colonel, C.A.M.C., and was Assistant Director of Medical Services in charge of records, with headquarters in London. His duties made him historical recorder of the medical services of the Canadian expeditionary forces, and his "War Story of the Canadian Army Medical Corps" is a very readable volume, his facts being based as much upon the diaries of individual medical officers as upon official documents. The corps were fortunate in their biographer, for Adami was not afraid to call attention to defects in the official records, and to supply an interesting background to facts as recorded. His history gave the professional reader a bird's-eye view of the development of military medicine as exemplified by the work of the C.A.M.C. The Bulletin of the Canadian Army Medical Corps (March, 1918, to May, 1919) bears evidence of his activities in articles on wound infections and reports of enemy air

raids on Canadian hospitals. In 1917 he was made Chairman of a committee to look into the standardization of routine pathological methods, and he actively organized and carried out various researches into the pathological conditions induced by "battle, murder, and sudden death." He was appointed C.B.E. in 1919.

With the close of the War (1919) he was undecided what to do. About this time the Vice-Chancellorship of the University of Liverpool fell vacant on the retirement of Sir Alfred Dale. Friends of Adami prevailed upon him to submit his name as a candidate for this place, and they asked Sir Clifford Allbutt and Sir William Osler to share in promoting his candidature, with the result that he was unanimously elected. As was characteristic of him, he threw himself wholeheartedly into his new duties and soon justified his choice. He did little more scientific work, giving his time and thought to his administrative duties as Chancellor, entering thoroughly into his new work, the social life, and educational problems of all sorts. By his enthusiasm and activities, his knowledge of public health and civic problems, he soon brought the University and town closer together than they had ever been before, all of which resulted in the advance of the University by a better moral and financial support from the city. But even with his multifarious duties as Chancellor he did not lose his interest in pathology and was reading and discussing papers of scientific interest as time would permit and occasions presented themselves.

The strenuous effort put forth in behalf of the University probably made inroads upon his general health, and the last two years of his life showed a gradual decline, the seriousness of which no one knew better than he, though he was active almost to the last. He died August 29, 1926, and was buried in Allerton Cemetery, Liverpool.

Adami received many honors: he had honorary M.D. as well as LL.D. from three schools, was F.R.S., F.R.C.S., F.R.C.P., C.B.E. and D.Sc. Some of these degrees were duplicated in Scotland as well as in Canada. He held offices of honor and trust in many organizations. He was President of the Association of American Physicians in 1912. Everywhere we find him, his efforts are constructive. He found good in everything and strove to bring out the good in the most practical way.

Socially, Adami had many friends. He was Vice-President of the University Club, Montreal, for ten years; was a member of St. James and Mt. Royal Clubs, Montreal. He was bright and genial in his manner, an ideal host who readily made his guest comfortable and at ease, whether he were the humble student or the highest prelate. He had a well appointed home, one that reflected to a degree his artistic taste. His hobby was porcelain, of which he had an unusual collection. He was twice married, first to Mary Stuart Cantile, daughter of a well-known Montreal merchant and niece of Lord Mount Stephens. To them three children were born. One died in infancy; the other two, a son and a daughter, reside in England. His second marriage was to Marie Wilkinson, daughter of the Rev. Thomas Wilkinson, Vicar of Litherland. She survives him.

Adami was a man of rare ability. Above all, he was a great teacher: first, because he was a deep and thorough student, and then, because he not only knew much, but was gifted with the ability to impart knowledge to his fellowman. By his energy and enthusiasm he gave inspiration, by his fairness and kindness he won the admiration and love of his students, by his sincerity, high ideals and honesty of purpose he won the respect of his colleagues of the faculty; by his effort in the public welfare he won the commendation of his people everywhere; by the response to his native land in time of war he won the esteem of his country; and everywhere he taught men how to get the *summum bonum* in this life.

* * * *

In writing this brief sketch I wish to acknowledge, with gratitude, the assistance given me by Dr. C. F. Martin, Dean of McGill Medical School; Dr. A. G. Nicholls, a member of the editorial staff of the *Canadian Medical Association Journal* and collaborator with Adami in his second volume, "Principles of Pathology," and Miss Pauline M. Carriere, Librarian at McGill. I have also made free use of the obituaries written by those who knew Adami well, published in the *Canadian Medical Association Journal,* the *British Medical Journal, The Lancet,* and the *Journal of Pathology and Bacteriology.*

FUNDAMENTAL FACTORS IN THE PATHOGENESIS AND TREATMENT OF PEPTIC ULCER*

By C. S. DANZER, M.D., F.A.C.P.,†
Brooklyn, N. Y.

Ideal therapy is that based on an understanding of the cause and nature of disease. In ulcer of the stomach we have had to proceed without such illuminating knowledge.

The treatment has consequently been largely empiric and symptomatic. This method is, indeed, not to be decried. We need only recall that cinchona had been used in malaria and mercury in syphilis long before the discovery of their respective parasitic causes. Nevertheless, modern therapy aims at the origin or cause of the disease.

Though a century has elapsed since Cruveilhier[1] gave the lucid description of this disease, the cloud of obscurity regarding its origin has not yet been removed. It is not strange, therefore, that only one-half of the cases treated by medical or surgical methods are cured. On the other hand, the occurrence of scars at ulcer sites at post-mortem examination indicates that spontaneous healing may take place. The paradox between spontaneous recovery in some cases and the futility of treatment half of the time in others indicates the misdirected character of our therapy. The management of these cases, helpful as it is, fails to affect the etiological groundwork.

It is possible that one great obstacle in the way of a better understanding of this disease is the insufficient appreciation of the general or systemic nature of the malady; another is the relative subordination of physiological knowledge in clinical practice.

I shall attempt in this paper to give further evidence to prove that peptic ulcer is a constitutional disease with local manifestations in the stomach and finally to apply a few physiological facts to bedside practice.

The present-day knowledge of etiology has been derived from the following sources:

(1) Clinical studies and reasoning by analogy.

(2) The application of principles derived from comparative physiology.

(3) The reproduction of the disease by the experimental method.

Because this is a disease of the alimentary tract it was natural that dietary factors should occupy the foreground of medical thought. Thus Obrastzow[2] found that in Russia, where the peasants are on a meat-free diet for about half a year, the incidence of ulcer is slight. The same infrequency of gastric ulcer applies to the rice-eating races of Japan and China. This was ascribed to the acid-reducing effect of the vegetarian diet on the gastric juice. In the same category is Dr. Seale Harris's reference to the rarity of ulcer among the natives of the Himalayas. He attributes this to the high vitamin content of their fruit and vegetable diet.

On the other hand, the free consumption of vegetables and salads in the springtime and fruits in the fall in our own race is associated with a corresponding seasonal increase in the incidence of this disease at such times. Likewise, the change from a milk diet to one of raw fodder in calves is frequently attended with the development of duodenal ulcer. The coarse texture of the diet may be partially responsible.

Thus the vegetarian diet is said to account for both the frequency and rarity of ulcer by different observers. Obviously, the diet can assume only a subordinate or conditional role in the formation of peptic ulcer. Other factors are apparently necessary.

This is not at all strange. The studies of the pathologist Tendeloo[3] and the physiologist Hering[4] indicate that in the formation of a disease it is never a single cause, but rather a "constellation of factors" (Tendeloo), "a grouping of coefficients" (Hering) that is responsible. The mere presence of a bacterium in a tissue does not necessarily incite the disease. The association of an altered blood supply, and insufficient respiratory function of the part, perhaps chilling of the body surface or local traumatism must occur at a given moment for the disease to develop.

Similar is the case with ulcer. While it may require a special grouping of coefficients for the production of this condition, the one obligatory factor, to my mind, is the constitutional background upon which a variety of different causes may operate in the evolvement of this disease.

Let us look to the experimental studies for some additional information. Since the seat of election of ulcer at the pylorus or lesser curvature of the stomach corresponds closely with the

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*Read in Section on Gastro-Enterology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†Instructor in Medicine, Columbia University.

concentration of the nerve plexuses and blood vessels to this organ, the experiments naturally dealt with these two mechanisms.

(1) *Nerve Mechanism.*—Electrical stimulation or resection of either the vagus nerve or celiac plexus is followed by an ulcer which differs from the clinical type by the rapidity and spontaneity of healing. The clinical-pharmacological studies of von Bergmann[5] indicated a hyper-excitability of the vagus nerve and other parts of the involuntary nervous system in the ulcer patient. The clinical association of certain nerve diseases such as tabes dorsalis and vagus neuritis[6] with gastric ulcer compelled rather serious consideration of the nervous origin of this disease. It was thought that the essential feature might be some abnormality in the vagus nerve supplying the stomach. This notion was soon proven untenable by the work of Hausser,[7] who failed to find histological changes in the center or along the course of this nerve in a systematic study of ulcer cases conducted for this purpose.

(2) *Vascular Mechanism.*—Solid particles injected into the nutrient arteries of the stomach,[8] or vascular ligation,[9] are followed by rapidly healing ulcers or erosions. Only the injection of solutions which precipitate or coagulate the cellular proteins of the capillaries of the gastric mucosa[10] can produce typical Cruveilhier ulcers of the clinical type. Such a lesion may perforate or become callous or be followed by cicatricial contraction. The solutions used in these experiments were dilute formalin, hot physiological saline or dilute alcohol; the animals were rabbits or guinea pigs. These experiments gave strong support to the vascular theory of the cause of ulcer.

The experimental work on the production of gastric ulcer yielded the important conclusion that only those procedures which impede the blood flow to the mucosal capillaries of the stomach are capable of producing the typical lesions. The frequent occurrence of arteriosclerotic lesions in the smaller vessels of the stomach in older patients with this disease appears to be a clinical corollary of these experiments.

It seems that the abnormality in the circulation in the mucosa of the stomach is the backbone upon which the other factors may become engrafted. The vascular mechanism is a constitutional, perhaps inherited characteristic. The exciting causes may be dietetic, climatic, racial, toxic (tobacco, lead, bacteria) or nervous.

The following is the evidence to bear out this hypothesis.

About a decade ago the writer, like numerous others both at home and abroad, became interested in the general subject of the capillary system. In conducting the studies which eventually led to the development of the Danzer-Hooker method for the determination of human capillary blood pressure,[12] I was impressed with the variations in the appearance of these cutaneous vessels in different people. I must confess my inability to correlate them with definite clinical pictures at that time. In some cases of gastric ulcer the capillaries in the skin were very narrow and tortuous and seen with great difficulty. In others, these vessels were varicosed or even aneurysmal in appearance. Soon there came the results from the medical, surgical and pathological divisions of the University of Tubingen which clarified the mass of confusing data hitherto obtained.

Schmincke[12] and Duschl[13] found on careful examination of the interior of the stomach wall of ulcer patients a widespread spotty or focal hyperemia. This was evident both to the naked eye and on microscopic examination.

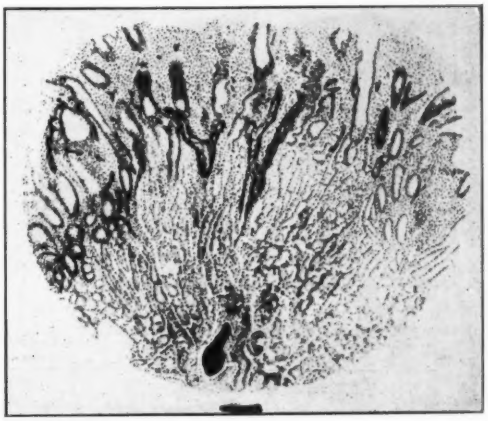


Fig. 1
Focal congestion of the mucosal capillaries from a case of ulcer of the stomach. (After Schmincke.)

Localized areas of distension of the capillaries with blood were not only seen at the site of the ulcer, but throughout the whole stomach. This was an elaboration and confirmation of the earlier work of Motoi Kabajashi,[14] who found in the necrotic area of the ulcer very wide capillaries such as those ordinarily seen in extreme congestion.

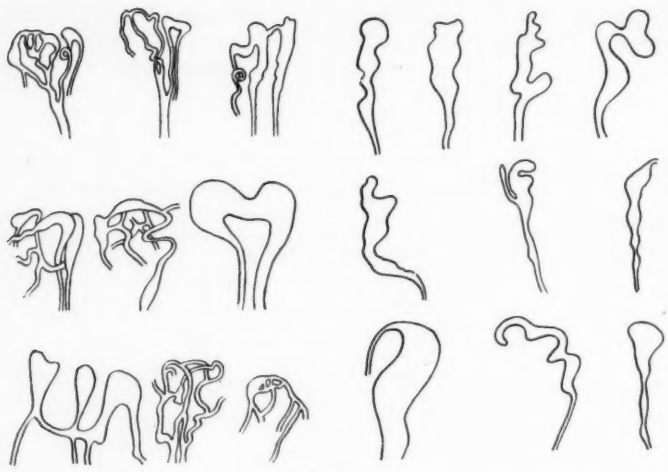


Fig. 2
Characteristic abnormal capillaries in the mucosa of ulcer patients.

Careful examination of the individual capillaries and plastic reconstruction of the mucosal vessels showed them to be enormously dilated, giving them the appearance of varicosities or aneurysms. In certain areas a glomeruloid or tuft-like arrangement of these minute vessels was seen (*Figs. 2 and 3*).

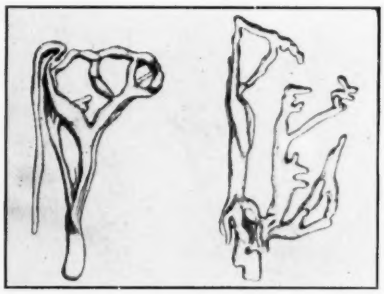


Fig. 3
Reconstructed glomeruloid capillaries found in ulcer stomachs. (After Duschl.)

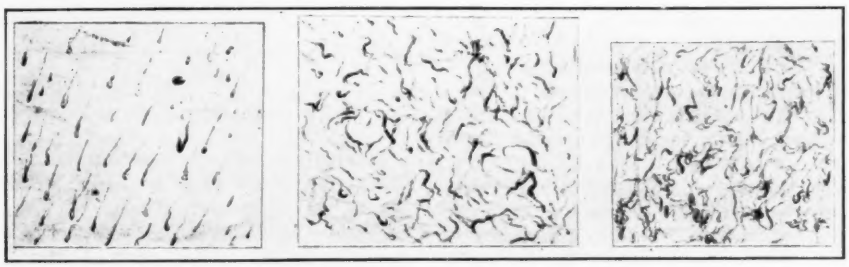
Parallel studies made on similar material removed at operation from cases of carcinoma of the stomach failed to show such abnormalities of the gastric circulation. In these researches the tissues removed at operation were immediately immersed in warm saline solution and all other necessary precautions were taken to prevent the occurrence of artificial or post-mortem circulation changes. This enhanced the value of the observations.

At the same time Mayer-List[15] found abnormal capillary pictures in the vessels of the buccal mucous membrane in ulcer patients. Instead of the normal hairpin or U-shaped capillaries arranged in parallel fashion, they were thickened, tortous, increased in number and showed no regularity in their course or arrangement (*Fig. 4*).

Normal people or those with stomach carcinomas failed to disclose similar changes.

But the final link in the chain of evidence indicating the profound universal pathological capillary system was offered by the classical work of Ottfried Muller[17] and his school. This investigator found analogous aneurysmal capillary formations even with pericapillary hemorrhage in the skin of certain cases of gastric ulcer (*Fig. 5*).

Thus we see the existence of a profound al-



A B C

Fig. 4
(After Mayer-List.) Capillaries in the buccal mucous membrane. (A) Normal individual; (B) Constitutional vaso-neurotic; (C) Patient with a gastric ulcer.

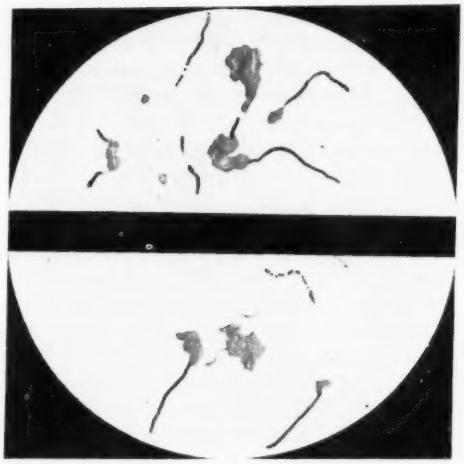


Fig. 5
Aneurysmal capillaries in the skin over the forearm in a case of peptic ulcer. (After Müller.)

teration both in the capillary circulation in the lining of the body cavity (gastric and buccal mucosa) and the cutaneous covering. In the varicosities and aneurysms of such capillaries the circulation is extremely sluggish, well nigh stagnant. It is easy to see that any influence which would further tend to slacken the blood supply to the stomach would have to produce a necrosis in the part of the mucosa so affected. It might be a contriction of an ateriole in the stomach wall, due to tobacco, emotion, or the splanchnic vessel contraction occurring in the various types of arterial presser states. The important fact to be remembered is that we are dealing with a permanent constitutional defect in the circulation which is subject to numerous physiologic and pathologic influences which must result in the formation of the aforesaid mucosal necrosis or erosion which may progress to the state of chronic indurated peptic ulcer.

The inter-play of the circulation on the outside and inside of the body explains the aggravating effect of influences acting on the body surface in this condition. Thus, patients in a remission stage experience an exacerbation of their symptoms following a common cold. It is likewise plain that focal infections in the appendix or tonsils may play an important role not because of metastatic influences such as Rosenow at one time postulated, but because of the depleting effect on the tone of the blood vessels. That bacterial toxins produce such results is strikingly seen in the case of the peripheral vascular failure in pneumonia or influenza. The beneficial results of an appendectomy on the course of a gastric ulcer are easily comprehended.

Similarly those agencies that tone the peripheral circulation and the general hygienic and dietetic measures which are useful in any chronic, painful, exhausting disease, will be applicable. The nodal point upon which all of these influences must operate is the capillary circulation in the mucosa of the stomach. Thus hydrotherapy (tonic baths of various kinds), a change of climate from the flatlands to mountain regions, from the inlands to the seashore, exposure of the body surface to the sun's rays or the artificial ultra-violet light will influence very markedly the blood flow, both on the outside and the inside of the body. If we accept the idea that this disease is essentially a vasomotor circulatory disturbance the rationale of the therapeutic procedures suggested seem plain.

We are likewise enabled to understand the very enthusiastic reports by Lenk[17] on the beneficial effect of the x-ray in cases of ulcus ventriculi. Certainly the most likely mechanism of this action is through its effect on the circulation in the covering and the lining of the body. That the roentgen ray will increase the cutaneous circulation is seen in the skin erythema which follows such exposure. We must admit, however, that the x-rays by their destructive action on the body cells may produce an effect similar to the injection of foreign protein and thus account for the results obtained.

Concerning the effect of foreign prôteins in this disease, I may add that we have had fairly satisfactory results from the use of milk, aolan, yatren-casein and novo-protein injections. Of the *modus operandi* of foreign protein injections, we can only say that they produce an omni-cellular stimulation effect which helps in the various repair processes of the body. The exact mechanism is not yet clearly understood.

But what about the dietetic treatment of the disease, the rest cure in bed, the time-honored milk or alkali cures? Should we, in the light of the newer knowledge, discard the heritage of clinical experience handed down by the old masters? It seems to me that this would be falling into a grave error. The rest cure in ulcer of the stomach is as important today as it ever was. The only thing that might be changed is the explanation of the manner by which it acts. From the facts at hand it would appear to us that it is not so much a rest to the stomach as

it is the restorative effect on the numerous vital processes that goes with the rest in bed. Its effect may be compared with that of the Weir-Mitchell cure in cases of neurosis or the rest cure for tuberculosis or any other severe exhausting disease.

Nevertheless, in every disease one factor stands out pre-eminently, without which the disease cannot exist. As examples, we may mention the tubercle bacillus in phthisis or the familial constitution in hemophilia. In gastric ulcer it is the constitutional vascular disturbances of the stomach. This, therefore, should be the object of our therapeutic endeavors. In the light of physiological knowledge it is impossible for the rest in bed or starvation treatment to effect an arrest in the work of the stomach. On this ground I should reject any form of starvation treatment. On the contrary the diet should be abundant and rich in vitamins.

Furthermore, we favor the alkali therapy, the low protein and bland diet because of the effect on the acidity of the stomach. The reduction of the gastric acidity will bring about an inhibition of excessive peristalsis and thus diminish the pain. This treatment, however, is symptomatic and for immediate relief.

How are we to explain the action of atropin or its less toxic derivative, novatropin, in the healing of this condition? Microscopic studies on the cutaneous capillary circulation in man by des Arts[18] showed that atropin has an alternating contraction and relaxation effect upon the capillaries. It produces a form of vascular massage which might be assumed to accelerate a stagnant circulation in the skin. We have already seen a parallelism between the vascularity in the stomach mucosa and the skin. Hence we may assume a corresponding beneficial effect on the circulation in the stomach from the use of this drug.

That cases of peptic ulcer show cutaneous vasomotor disturbances and that vaso-neurotics sometimes develop gastric ulcers are clinically recognized facts which bear out the linking relationship between the circulation on the outside and inside of the body.

There are two other features which appear to me of importance in this connection, one of which is the treatment of the nervous system; the other is the catarrh of the stomach which co-exists in many of these patients.

We have already intimated that many of them are constitutional vaso-neurotics. That the nerves, particularly of the involuntary system, influence the tonus and other functions of the capillaries has been abundantly proven in recent years by the work of Krogh,[19] L. R. Miller[20] and Danzer-Hooker.[12] Hence, in neuro-circulatory disturbances of the capillary system of whatever nature, sedative treatment by drugs (bromids, valerian, calcium, the barbituric acid series), or hydrotherapy may help.

The other feature to be mentioned is that based on the co-existence of a catarrhal gastritis with diffuse capillary lesions throughout the whole stomach wall. This may be treated with mildly alkaline mineral waters (Karlbad Muhlbrunn, Celestine Vichy) or occasionally lavages.

The conception of the neuro-vascular etiology of gastric ulcer is by no means a new one. Morin,[21] as far back as 1800, already expressed such a possibility. What I have attempted to do was to furnish some definite evidence to support this idea and to show how it may influence our therapeutic outlook. The theory here expressed has served to explain to me the beneficial effects that have been obtained by patients who refused to undergo the customary ulcer regime, but chose a three or four weeks' stay at a mountain or seashore resort, took a liberal diet, and have nevertheless obtained a remission in their symptoms if not an actual cure of their ulcer. I venture to say that more patients would recover if they were sent to a tuberculosis sanatorium and put on its routine treatment than if treated by the methods employed in the best of our general hospitals.

CONCLUSIONS

(1) Ulcer of the stomach is not a local disease of this organ. It is a generalized systemic disturbance with local manifestations in the stomach. This consists in a capillary stasis of the gastric mucosa followed by an erosion of the mucous membrane, and finally the development of a typical ulcer.

(2) For the development of this condition an hereditary or constitutional "Anlage" of the circulation in the stomach is a *sine qua non.*

(3) The best results in the treatment of gastric ulcer will follow the adoption of the conception of the constitutional nature of this disease.

(4) The results of such therapeutic methods as the rest cure, climatic treatment, helio, x-ray, foreign protein, atropin, dietetic and alkali therapy are discussed.

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DISCUSSION (*Abstract*)

Dr. Julius Friedenwald, Baltimore, Md.—Up to a comparatively short time ago, as Dr. Danzer said, peptic ulcerations were considered almost entirely of local origin and cure was expected to follow treatment or removal of the local lesion. Nowadays we know, however, that we are dealing with an entirely different problem. In a paper presented at the meeting of this Association in 1924, Dr. Morrison and I pointed out some of the factors involved in the etiology of peptic ulcer. In a series of 200 of our cases the following were noted: infections, 42 per cent; disturbances of the nervous system, 14 per cent; disturbances of the endocrin system, 4 per cent; hyperchlorhydria, 8.5 per cent; trauma, 2 per cent; anemia (chlorosis), 14 per cent; arteriosclerosis, 13 per cent; syphilis, 2 per cent. These are by no means all, for, as Dr. Danzer has pointed out, the constitutional factor must also be taken into account and is most important.

The etiology of gastric and duodenal ulcer is therefore extremely complex, and it is evident that there may be many causes contributing singly or in combination to the production of this affection. In order, therefore, to secure the best results, both from medical as well as surgical treatment, it is important to determine as far as possible all causative factors.

Dr. J. E. Knighton, Shreveport, La.—The etiology of peptic ulcer has been a problem of the profession for many years. We should keep in mind the probability that all peptic ulcers are not due to the same cause. Many patients suffering from peptic ulcer have focal infections such as infected tonsils, dental abscesses or foci in other parts of the body. They fail to obtain relief from either medical or surgical treatment if these foci are not given proper attention.

Dr. Seale Harris, Birmingham, Ala.—I am convinced that deficiency of vitamins is one of the causes of ulcer, though I do not think it is the sole cause. This deficiency may act in affecting the general circulation and incidentally the circulation in the stomach. The infections are exciting causes in many cases, and I have seen excellent results following tonsillectomy for infected tonsils, or after the removal of teeth, or after treatment of an infection in the rectum. Focal infections do not necessarily refer to the teeth and tonsils. There are many other sources of infection. The important and essential thing in the treatment of chronic ulcers is to study the patient's past history, his mode of living, his habits of eating, his habits of work, and his general environment. We called attention, in an article published twenty years ago, to the fact that the overworked individual seemed to have ulcers more frequently than those who were not in a state of chronic fatigue, and that ulcers recurred more frequently in those patients. Kaufmann also called attention to the same thing fifteen years ago. The rest cure is as important as the diet in those patients.

Given the ulcer patient for treatment, what is our duty? We have this patient who is spending his money, often the last cent that he can get, for treatment. Now, to take a diet out of the text book, write it out and give it to the patient is one way of treating him, or we may let him lie in bed in the hospital, treat the ulcer, and not make any effort to find out the cause or even one of the many causes that has resulted in the ulcer. If we do nothing but give the patient somebody's routine diet we are not doing our duty. We should consider each patient as an individual and teach him how to live. That is the important thing in the practice of medicine, to teach the patient what to do to get well and what to do to remain well. We must take the ulcer patient as a pupil.

Tobacco is surely one of the etiological factors in the condition and the elimination of tobacco in the treatment is very important. The ulcer patient should be taught regular systematic habits of living; to have a full diet containing not only the proper amount of vitamins, but of carbohydrates and proteins and fat; and taught systematic exercises. Proper abdominal exercise after the ulcers have healed is most important in preventing remissions. As Dr. Danzer has pointed out, ulcer is a constitutional condition, or a general disease, with a predisposing cause, and I believe that infection plays a large part as the exciting cause of many cases.

Dr. Sidney K. Simon, New Orleans, La.—As Dr. Danzer has said, we do not need, even if we should accept his point of view in regard to the pathogenesis of peptic ulcer, to discard all our old theories. Peptic ulcer is the result of a process that affects the gastroduodenal wall whereby the blood supply is partially cut off and autodigestion persists. Dr. Danzer's theory, as I understood it, is that there is a dilatation of capillaries with resulting slowing of the circulation and this slowing of the circulation in the infected areas affords the opportunity and provides the ground work for the subsequent autodigestion by gastric juices which leads eventually to the formation of a gastric ulcer. Most of the theories we have had in the past have proceeded along these same lines.

The Doctor did not mention the work that has been done by Rosenow and many other bacteriologists on the experimental production of peptic ulcer by feeding certain bacterial strain. Rosenow used the streptococcal strains; Turk in New York used the colon bacillus and

they were both able to produce ulcers experimentally, but they were careful to say that these experimental ulcers do not resemble the clinical type of ulcer as we see it in the human being.

There is no question in my mind that peptic ulcer is the product of many factors and varies with each individual. That point has been sufficiently stressed. I am sure that the absorption of organisms from focal infections has been a source of peptic ulcer. I am also convinced, as was brought out many years ago by Stockman, that it is sometimes due to arteriosclerotic processes in the arterial vessels. I have never been very much impressed with the idea that the vitamins played a particular role. We have accused the deficiency of vitamins of all sorts of crimes. I have never associated it with the pathogenesis of ulcer. Dr. Danzer has brought out a new method of approach for the understanding of the production of a peptic ulcer. He does not give us a direct cause, but merely says that the dilatation of the capillaries leads to the production of the ulcer. Now what leads to the dilatation of the capillaries?

Does this condition of dilated capillaries occur congenitally, or is it a result of some post-congenital condition? If it does occur post-congenitally what are the factors that he thinks might produce in the skin and mucous membranes of the body this abnormal capillary configuration?

Dr. F. M. Durham, Columbia, S. C.—I have always contended that a peptic ulcer is a constitutional disease, that it is an end-result just as a gumma is the end-result in syphilis. Dr. Danzer did not tells us all the things that would cause this dilatation and I do not believe anybody could tell that. Constipation, overeating, overwork, lack of exercise, all may produce weak places in the machinery which would cause the ulcer to break down. There are many causes of hypertension and sometimes we cannot find any cause on earth for it.

The stomach and the duodenum are the trouble places in the switchboard, where ulcers make their complaint.

After a severe skin burn you will have an ulcer of the duodenum. I was called a few years ago to see a patient who was having constant vomiting and blood in the stools, following an erysipelas which covered the whole surface of the body. The erysipelas had burned the skin and the trouble had gone into the duodenum.

Dr. Danzer (closing).—I do not mean to convey the impression that this capillary disease or disorder is the immediate cause of ulcer. It is the background on which all of the other causes operate. I admit freely the importance of tobacco in the genesis of ulcer. We have even experimental evidences of that. It has been found recently that when a man smokes for a time the arm gets smaller because the capillaries in the skin contract and possibly a similar thing happens in cutting off the blood supply to the stomach. The repetition of this influence many times during the day would undoubtedly be a causative factor. Of course, there is a variety of factors.

As to the question whether we should discard all of our old conceptions, I should say no. I am too great an admirer of medical tradition to advocate any such radicalism. We might revise them a little, however, in the light of newer knowledge.

The point was made that this disease was an ischemic phenomenon of the circulation of the stomach. That, of course, is the old theory. The microscopic sections of the gastric mucosa do not bear this out. These show areas of congestion. It resembles the condition of passive hyperemia.

I failed to mention Dr. Rosenow's work. The lesions that he produced belong to the class of erosions rather than of true ulcers: in other words, temporary ulcers that heal in several weeks without any further trouble. That is not the ulcer that we know clinically. The peptic ulcer seen in clinical practice is an entirely different proposition and, while I confess that the removal of focal infections, particularly the appendix, is very important, I do not know that it is the most important factor. There are some ideas to support the view that the foreign proteins and the absorption of one's own blood injected into the muscle in the form of autohemotherapy will produce a good effect.

How often has it happened that a patient is operated upon erroneously? Perhaps there is an ulcer and the surgeon removes some other organ like the appendix. For a time the patient gets better. It is possible that the absorption of the blood at the time of the operation may be a form of autohemotherapy, and be responsible for the improvement.

I concede the clinical fact that when you remove certain foci of infection you aid in the cure of this disease. I am not sure that it is the removal of the infection *per se*.

In some of these cases I have done the blood sedimentation test. As you know this is a fairly good index of the presence of infection generally. I have never found in the limited material at my disposal an increase in the sedimentation rate so that I would be a little hesitant in ascribing to an infectious focus a determining role in this condition.

What causes ulcer I do not know. The ulcer constitution may be inherited. I do not think that every one who has a mottled skin has a peptic ulcer, but I do think that the background is there, and, given the factors of smoking, overwork, overeating, insufficient rest and nervous factors of various kinds, that individual will develop an ulcer. It is a clinical fact that certain cases with various vasomotor disturbances of the skin eventually show the presence of an ulcer in the stomach. I have one case associated with hay fever and urticaria. Why only some cases will show these vasomotor skin symptoms I do not know.

BRONCHO-PULMONARY LYMPHADENOPATHY*

By JOHN D. MACRAE, M.D.,
Asheville, N. C.

Lymphoid tissues hypertrophy as a reaction to irritation, which may be mechanical, infectious or toxic.

The stone cutter's broncho-pulmonary lymph glands become enlarged and when examined are found to be full of dust particles. There is often extensive lymphadenopathy in children sick

*Clinic, General Clinical Session, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

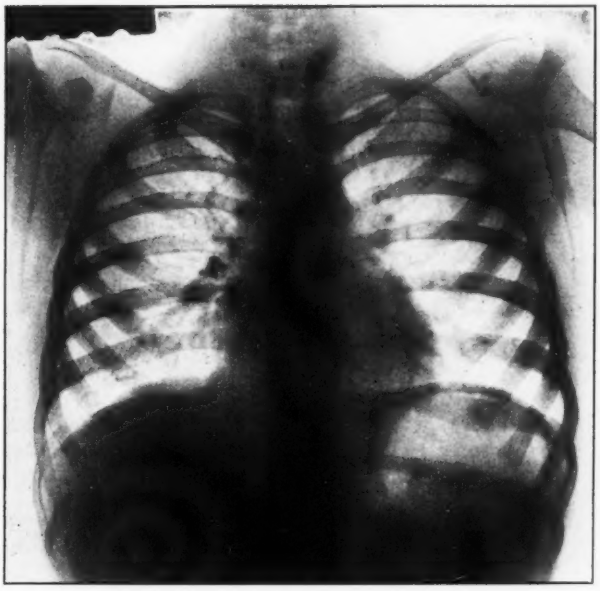

Fig. 1
Calcified tuberculous lymph nodes at each hilum. Patient has bone tuberculosis.

with whooping-cough, scarlet fever or mumps because of toxic material circulating in the blood and stimulating the multiplication of lymph cells. The toxic and bacterial types are merged into one another and are scarcely to be differentiated. The tubercle bacillus is almost certain to start lymphadenopathy.

Lymph collects in spaces which are so placed that it bathes practically all the tissues of the body. It is generally a clear fluid and contains numerous lymphocytes. Lymph does not flow directly into the capillaries of the lymphatic circulation, but it passes into them through the walls of the lymph spaces. The lymphocytes traverse the wall by a diapedetic movement. The lymph then flows through capillaries and channels from the periphery toward the center of the body. It eventually flows into the subclavian veins to mix with the blood.

Lymphoid tissue is the body's most important defensive agent. Lymphocytes are present in superabundance wherever a point or area of inflammation is found. By their phagocytic function they destroy bacteria or surround them and convey them to lymph masses or nodes, where they may be attacked by a greater number of lymphocytes. Also the number of white cells circulating in the blood is increased in the presence of acute infections.

While broncho - pulmonary lymphadenopathy occurs as one of the manifestations of a general toxemia, it is generally the result of drainage of bacteria-laden lymph into the hilum and mediastinal lymph nodes.

Lymph circulation or drainage in the chest, as elsewhere in the body, is from the periphery toward the center.

A single branch of the bronchial tree is accompanied by veins, arteries and lymphatics. Radio-

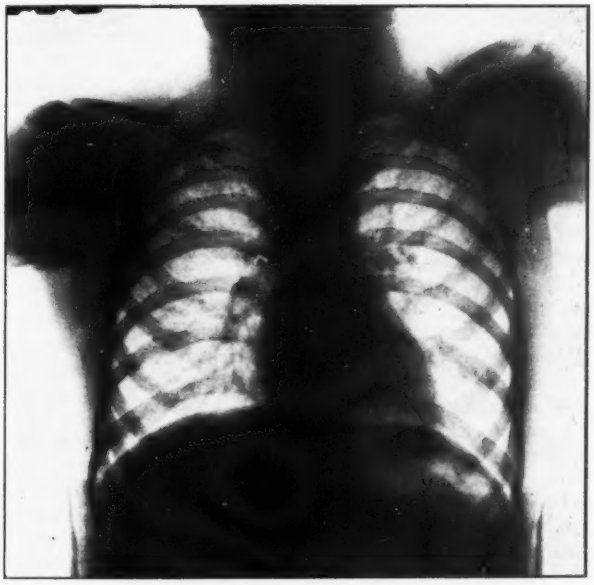

Fig. 2
Broncho-pulmonary lymphadenopathy; whether tuberculous or from some other cause not determined from x-ray films. The patient is in a plaster cast because of infantile paralysis.

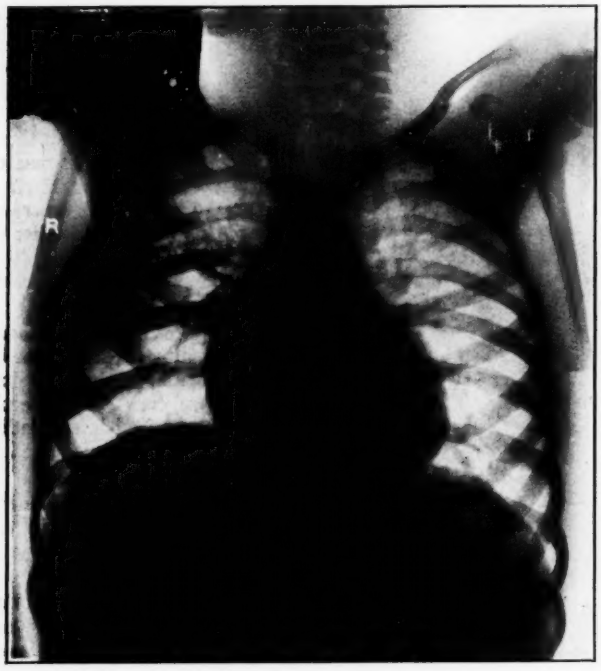

Fig. 3
Adult type of fibroid tuberculosis in right upper chest. Hypertrophied lymph nodes in each hilum. Patient about six years old.

graphically demonstrated, it is a trunk extending from the hilum outward to the periphery of the lung. In order to understand pathological processes in the respiratory tract, one must study lung anatomy with special reference to lymphoid tissue and lymph drainage, and must consider, first, infections and secondary processes.

The anatomical unit of lung structure is the primary lobule. Millions of similar units together make the lung. The primary lobules are found at the extreme ends of the terminal branches of the bronchial tree. At the place where a bronchiole looses its ciliated epithelium it becomes a bronchiolus respiratorius, because air cells spring from its walls. Air cells increase, it divides into several ductuli alveolares which dilate into atria. From the walls of the atria sacculi alveolares develop and alveoli pulmonium or air cells cover the walls of the sacculi. A branch of the pulmonary artery accompanies the bronchiole and divides and subdivides as the bronchiole does until the air cells are covered by the arterial capillaries.

In the primary lobule, veins arise from the end of the ductulus alveolares from places where bronchi divide, from the pleura and from the arterial capillaries. The veins lie on the periphery, while the artey is in the center of the lobule.

Now we come to consider the lymphatics, about which we are most concerned. There is no capillary lymph circulation immediately about the air cells in the primary lobule, but a rich network of lymphatics forms within the walls of the bronchi and extends throughout the bronchial tree. It does not extend beyond the ductuli alveolares. This network communicates with similar ones surrounding the pulmonary arteries and veins.

Groups of from fifty to two hundred primary lobules constitute secondary lobules and such an aggregation is surrounded by fibrous septa. On the lung surfaces one recognizes many-sided forms which represent the bases of secondary lobules outlined by the septa surrounding them. Lymph channels are abundant in the septa and some lymph drains to the pleura in them. A primary focus of infection is probably enclosed within the fibrous septum surrounding the secondary lobule.

For our purpose we will consider that vast lymph current starting in the periphery of the lungs and flowing through capillaries and channels along the various trunks to the lung root.

Minute groups of lymph cells lie in intimate relation to the lymph current. These are placed in the crotches where veins, arteries and bronchi divide and they become larger the nearer they are to the hilum. At the hilum these masses of lymphoid tissue have capsules of fibrous tissue. They are true lymph nodes or glands. Lymph from the periphery of the lung flows through them into mediastinal nodes and eventually reaches the blood current in the subclavian veins.

Having thus briefly traced the lymph current and located the glands, let us consider the effect on them which comes with infection.

The broncho-pulmonary lymph adenopathy in-

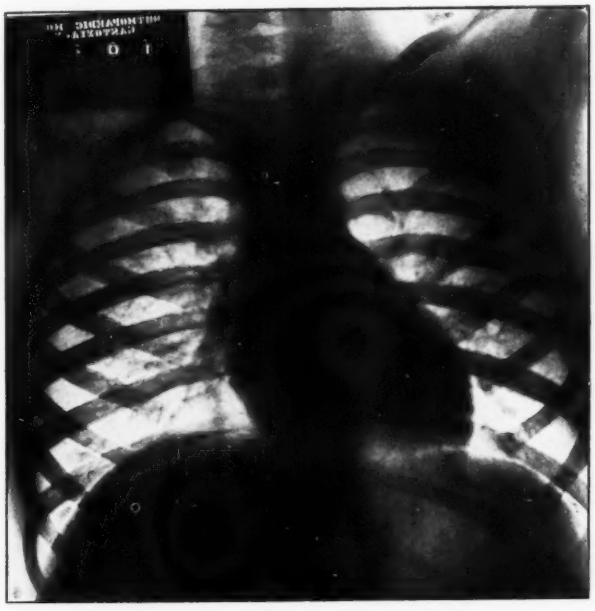

Fig. 4
Non-tuberculous broncho-pulmonary lymphadenopathy of moderate degree. Patient has had whooping-cough and influenza.

cident to influenza is rather general in its distribution. Moreover, it is explained by the history of the preceding sickness. The same is true when we have adenopathy after whooping-cough, mumps, or measles. In these cases we expect normal convalescence to clear up the diagnosis.

Tuberculosis infection may be the reason for the delayed convalescence, or it may be that we are dealing with the obscure signs of early tuberculous infection.

First, infection probably does not occur in the lymph gland but the tubercle bacilli, being inhaled in dust pass through the trachea and bronchi to a point beyond the ciliated epithelium and lodge on the mucous membrane where being an irritant they are attacked by lymphocytes. The bacilli, being too numerous or too virulent for quick destruction are carried by these agents to a mass of lymphoid tissue, then the primary infection takes place. From this focus organisms are swept inward in the lymph to the hilum and mediastinal glands infecting and causing hypertrophy of many small lymph masses along the way.

In the very young, resistance is relatively low and lymphoid tissue abundant. Therefore the glands become infected and they quickly hypertrophy. At the same time the primary focus heals and having been very slight, no scar is left. Many such infections occur in a child as it grows up and are healed without producing symptoms. In the glands which are thus infected the organisms may be destroyed by the lymphocytes or the inflammatory process may be terminated in calcification. Those which we are interested in are the ones where infection extends from pulmonary to bronchial and from bronchial to tracheal and para-tracheal glands. Hypertrophy takes place where the lymph from the primary focus first reaches the glands and for a time is regional, but as a rule by the time physical examination can elicit signs the hilum glands are greatly enlarged. In fact, the x-ray examination discloses much greater enlargement than the physical examination would lead one to expect.

X-ray examination of the lungs of many children must be done before one can determine what is normal and what represents disease. There seems to be no distinct line of demarcation between them. The lymph glands at the root of the lung increase in size as the infant grows to childhood and adolescence, in accord with its pathological experiences and the amount of dust it inhales.

Lymphadenopathy which is due to non-tuberculous infections is apt to be transient while tuberculous broncho-pulmonary lymphadenopathy is very chronic.

When marked pressure signs develop, the disease is far advanced and history and clinical signs are so definite that the diagnosis is made from casual study.

CONCLUSION

Lymphoid tissue is one of the body's most protective forces. It hypertrophies as a reaction to toxic, irritant and infective agents.

Lymphoid tissue in the respiratory tract may react to any of the above agents. Tuberculous

broncho-pulmonary adenopathy is the most important type.

Differential diagnosis rests on history of contact or previous disease, clinical signs and x-ray findings.

MIXED TUMOR OF THE KIDNEY IN AN ADULT*†

By HARVEY S. THATCHER, M.D.,
and
PAUL M. FULMER, M.D.,
Little Rock, Ark.

Mixed tumors of the kidney are not uncommon in childhood, especially during the first three years of life. They are extremely rare in the adult. The presence of bone in these tumors is also rare. These are the reasons for reporting this case.

Mrs. M. F., an American housewife, white, aged 59 years, entered Pulaski County Hospital October 1, 1928, complaining of a severe pain in the right side with occasional vomiting. She had become suddenly ill two days before admission. Because of her mental condition no further history was reliable. However, it was ascertained that she had visited the Clinic of the University of Arkansas School of Medicine for osteomyelitis September 30, 1927. At that time a tender mass was palpated in the right abdomen, which moved with respiration. She reported that she had had pain in the right side for six years when she did heavy work or when her clothing was too tight.

Upon physical examination there was a mass in the right abdomen just below the ribs. This was movable and slightly tender.

The patient was cystoscoped by Dr. G. W. Reagen and a kidney function test was performed. The dye appeared in the left catheter in three and one-half minutes and in the right in fifteen minutes. There was only a small amount of urine in the right kidney.

The Wassermann reaction was positive.

The right kidney was removed October 5, 1928, by Dr. Paul M. Fulmer.

Pathological Examination.—The kidney with tumor weighs 610 grams. There is a sharp demarcation between the tumor structure and the parenchyma of the kidney. The surface of the tumor is irregular, lobular and greyish red. It is located in the upper pole and measures 10 x 7 x 9 cm. It cuts with difficulty because of the presence of osseous tissue in the center. There are six cysts varying from 1 to 3 cm. in their largest dimensions. The walls of these cysts are smooth and grey and surrounded by firm, fibrous tissue. Some of the smaller cysts are multilocular, empty or contain a small amount of fluid. The surfaces made by sectioning are dark red, brown and grey. The uninvaded kidney occupies about one-fifth of the structure and is located in the lower pole. The pelvis is almost

*Clinic, General Clinical Session, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

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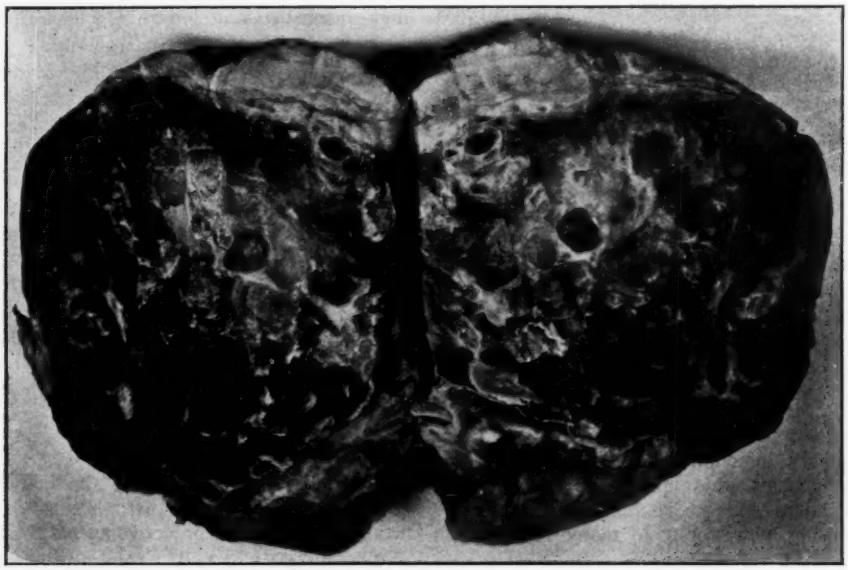

Fig. 1. Tumor of the kidney. The light central region contains osseous tissue.

Fig. 2. Microscopic section of an island of bone in the tumor the kidney.

obliterated except one small portion, which is bulging. The lining contains petechiae (see *Fig. 1*).

Dense and finely fibrillated connective tissue with a few elastic fibers is present, together with smooth muscle, islands of bone and regions of blood vessels. There is no orderly arrangement of this tissue. The only attempt at regularity in the morphological picture is a small nodule at the upper pole composed entirely of an alveolar arrangement of cells. These regions, together with others, are arranged like tubules with cuboidal cells supported by scant and extremely vascular connective tissue stroma. Other regions are composed of small spindle cells. Some of the alveoli are solid, while others have a lumen. The cells are irregular in size and shape; also the alveoli.

Fig. 3. Microscopic section of tumor of the kidney. The lower portion contains cells arranged like tubules of the kidney. The upper portion includes smooth muscle bundles and spindle cells.

The nuclei stain deeply. Much connective tissue is distributed in various parts of the sections. Dense regions of fibrous tissue are present, especially about the islands of bone. The small bundles of smooth muscle are not prominent (see *Figs. 2* and *3*).

Various theories have been brought forward to explain the origin of these tumors. They have been summarized by Ewing recently. Developmental disturbances in the embryonic kidney are suggested by these theories, but no one source can be proved. The tumor discussed is evidently an embryonic fibromyo-osteo-adenosarcoma. There is an arrangement which imitates renal tubules. Metaplasia of renal structures derived originally from the renal blastoma may be an explanation for some of the tissue. However, this explains only structure and occurrence. Why the embryonic cells begin to grow has not been determined.

TREATMENT OF CONGENITAL SYPHILIS*

By JOSEPH YAMPOLSKY, M.D., F.A.C.P.,
Atlanta, Ga.

In suggesting a complete treatment in congenital syphilis, I wish to bring to your attention a method which was worked out by me with the assistance of Dr. George F. Klugh five years ago. There are many drugs used in the treatment of congenital syphilis and probably as many as are used in acquired syphilis could be utilized in the treatment of lues in infancy. However, since my treatment consists exclusively of intraperitoneal injections of drugs, I can report only on the two drugs that have been used in this series, neo-arsphenamin and mercurosal.

Experiments on rabbits proved conclusively that no peritonitis was caused by the injection of these drugs into the peritoneal cavity. In the first two human beings treated in that manner it was proven on x-ray examination of the gastro-intestinal tract that no adhesions followed.

The injections are given intraperitoneally a little below the umbilicus and to the left with a

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*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

dull needle. They are given rapidly into the peritoneal cavity. The dose is as follows: neo-arsphenamin is given 0.1 gram in a 2 c. c. solution of normal saline for every fifteen pounds of body weight of the patient. The mercurosal is given as it comes in solution, and the dose is 0.5 grain for every thirty pounds of body weight of the patient. A course of treatment consists of sixteen weekly injections, the neo-arsphenamin and mercurosal given alternately every week. Thirty days of rest are then allowed and a Wassermann test is done on the patient. If the Wassermann is negative, sixty days are allowed to elapse before the next treatment is given. If the Wassermann test is positive, sixteen more injections are given at once. Two courses of treatment are required during the first year of life.

The value of giving these treatments in early life can only be estimated properly when we realize that the disease in infancy is in acute form, and next to the intravenous method this is certainly the best. Absorption from the peritoneal cavity is rapid and there is absolutely no discomfort after the treatment.

I have at present in my series nineteen cases. Most of these cases have been in very young babies. None has suffered discomfort, but all showed marked improvement with disappearance of symptoms. In only four cases out of a series of nineteen the Wassermann remained positive after two courses of treatment. Since it is very difficult to give medications in young infants intravenously, I feel that the intraperitoneal method is of great value in the early stages of congenital lues.

CONCLUSIONS

(1) In nineteen cases of congenital syphilis covering a period of over four years, patients were given sixteen to thirty-two intraperitoneal treatments, and in one case eight. Only four of these cases presented a positive Wassermann after treatment. No cases showed any signs of congenital lues.

(2) Both neo-arsphenamin and mercurosal were given intraperitoneally. These caused no deaths and no peritonitis or adhesions in experiments upon rabbits. There are no bad effects on human beings as shown by x-ray and fluoroscopic examination.

(3) Absorption is rapid from the peritoneal cavity, and if intraperitoneal injections are made with proper aseptic technic which is expected in all surgical procedures, they should be attended by no bad sequelae.

910 Candler Building

DISCUSSION (*Abstract*)

Dr. F. J. Eichenlaub, Washington, D. C.—I am very much interested in this method of treating congenital syphilis with intraperitoneal injections, but as I have never given such an injection I am not competent to discuss it. I know that the use of sulph-arsphenamin intramuscularly in young children has been very satisfactory.

Dr. E. R. Hall, Memphis, Tenn.—I do not believe the intraperitoneal injection of arsphenamin should be adopted by every one. We have very little trouble getting into the jugular vein of babies. We put the baby on the left or right side, pull the head down across the table and the jugular vein stands out very promptly. I feel about the intraperitoneal method as I do about blood Wassermanns from the longitudinal sinus. For a long time you may have no trouble obtaining blood, but at another time something will happen. I believe if we do enough intraperitoneal arsphenamin injections we will find some case that will cause trouble. It is like the man who does tonsillectomies and says he has never had a bleeder. Perhaps he has never removed enough tonsils. The same thing is true here, but they have not given enough arsphenamin injections.

Dr. M. A. Selinger, Washington, D. C.—I have had considerable experience at the Children's Hospital in Washington at the luetic clinic which we have run for the last ten years. I feel as the last speaker does as to intraperitoneal injections of any kind, particularly of arsphenamin or neo-arsphenamin as a routine treatment. It is not a safe thing to put substances of that kind which we know are irritating into the peritoneal cavity. We do not know just how long it will take adhesions to form nor just what other adverse conditions may arise. It is a perfectly simple thing with a little experience to treat practically every one of these infants by the intravenous route. We have done it continually in Washington for the period stated and have not had any special difficulty. You cannot do it the first time, but with comparatively little practice it is easy. We know that it is safe, we get results, and we feel that we are not justified in trying the other route.

Dr. Yampolsky (closing).—As to my method's causing peritonitis or adhesions, the x-rays we took of the first patients were done after many injections and showed that there were no misplacements of the organs and no adhesions. You will have some fatalities no matter what treatment you use. To those men who treat only an occasional case of congenital syphilis the simplicity of this method should appeal, even at the expense of an occasional fatality. We have treated hundreds of cases of congenital syphilis in Atlanta. I feel that enough work has been done to prove that the intraperitoneal method in general is not only safe, but sometimes life-saving. In emergency cases intraperitoneal injections are frequently life-saving. We should know all measures of medication. A young infant can be properly and safely treated by intraperitoneal injections.

ASSOCIATION OF CHRONIC COLITIS AND CHOLECYSTITIS*

By EUGENE M. CARR, M.D.,
Asheville, N. C.

The patient whose history I wish to report gave evidence of two pathological conditions which, in my opinion, are more commonly associated than many of us realize.

In February, 1927, a man aged 46, who complained of diarrhea and lower abdominal pain, was referred to me by his physician.

He was born in the mountains of North Carolina, had never been in the far South, and his past history was negative for acute infections, cardiovascular, pulmonary and renal disease. In the recent past he had had a mild sinusitis and several abscessed teeth had been extracted.

The diarrhea began in 1895, when the patient was only fourteen years old, and had recurred at intervals of from three to six weeks during the intervening thirty years. At first the attacks lasted several weeks, with five to eight stools a day, and severe, cramp-like pain in the lower abdomen. Recently the attacks had lasted only two or three days and in the periods between attacks bowel function had been normal.

Small amounts of mucus, but never any blood, had been noted in the stools. There had been no persistent loss of weight, no belching, heartburn, nausea, vomiting nor jaundice and never at any time had there been upper abdominal pain. These negative facts are important, as we shall see later.

Two years before I saw him the patient had been proctoscoped and was told that there were small ulcers in the colon. He was then put on a smooth diet and given tannic acid irrigation, which measures he followed with only slight, though definite relief.

Physical examination showed an undernourished middle-aged man. Cardiovascular, pulmonary and renal symptoms were essentially negative. Special nose and throat, dental and genito-urinary surveys revealed no evidence of primary foci of infection.

On abdominal examination no tenderness, masses nor rigidity could be found, though the descending colon was easily palpable. Rectal examination showed nothing. The blood picture was normal. Urine and blood Wassermann were negative. Gastric analysis showed a definite hyperacidity.

On repeated stool examination no blood, parasites nor ova could be detected. A proctoscope was inserted seven inches, showing definite spasticity of the sigmoid and a pale pink mucosa slightly granular in appearance, but with no evidence of bleeding or ulceration.

X-ray study after a barium meal revealed a normal looking stomach and small intestine. Between the six-hour and twenty-four-hour study the patient had three bowel movements and the colon retained only a trace of barium, which was chiefly in the cecum and ascending portion. The appendix was not filled. Gall bladder plates showed a very definite nest of stones.

The barium enema was most instructive. Under the fluoroscope the barium distended the ampulla in a normal manner. It then entered the sigmoid, passed with great rapidity up to the splenic flexure, and much more slowly to the cecum. Here we see the sigmoid and descending portion as a straight tube with complete loss of normal haustration; a double shadow which to the x-ray men indicates not only loss of elasticity, but actual thickening of the wall. There is accentuation of the haustra in the transverse colon, irregular filling of the cecum and ascending portion and, finally, a cluster of stones in the gall bladder region.

In summary, then, we have a patient whose subjective symptoms, diarrhea and lower abdominal pain suggest disease of the colon, who has had no symptoms pointing to gall bladder involvement, but in whom the objective findings indicate not only a severe degree of colitis, but also cholelithiasis.

At once a number of questions arise which we can discuss, but we cannot answer with any certainty.

(1) Are these two pathological processes entirely independent?

(2) Do they bear any causal relationship to each other?

(3) If so, which is cause and which is effect?

(4) Finally, what can be done for the relief of the patient's symptoms?

If we assume that this man had a latent cholecystitis with the development of stones, and quite apart from this contracted an amebic or non-specific colitis, which the history of ulcers in the colon, the long periods of remission and the tendency to gradual diminution of symptoms might indicate, our therapeutic measures should be directed toward the restoration of bowel function, and cholecystectomy might be considered unjustifiable.

The same conclusion would be true if we can believe that a primary infection in the bowel gave rise to a secondary cholecystitis with stones, which are producing no local or general symptoms. If, however, a latent gall bladder infection resulted in the colitis, removal of the gall bladder would seem imperative.

As the patient was an extremely intelligent man, the facts were laid before him much as I have outlined them here. He was told that no absolute decision could be reached, but, chiefly as a protective measure, cholecystectomy was advised. After four months of consideration he consented to the operation and in June, 1927, the gall bladder and appendix were removed and the abdomen explored.

Besides containing numerous small stones, the gall bladder wall was definitely thickened and the appendix showed evidence of chronic inflammation. There was no enlargement or scarring of the liver and there was no palpable thickening of the descending or sigmoid colon.

Recovery was satisfactory and in order not to cloud the issue, no medical treatment was instituted beyond

*Clinic, General Clinical Session, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

the continuation of smooth diet and tannic acid irrigations.

Today, one and one-half years after operation, the patient is greatly improved, though by no means in perfect health. He has gained eight pounds in weight and considerable strength. His attacks of diarrhea and abdominal pain, though much less frequent, of shorter duration and much less severe, have not completely disappeared. He feels that operation was thoroughly justified.

A recent barium enema showed an interesting change in the condition of the colon. We see here rather a striking contrast to the first picture. Though the sigmoid is angulated, narrow and redundant, there is much more normal haustration of the descending portion, which can be seen in spite of a gas pocket, and the double line shadow has almost completely disappeared. In general it is a fairly normal looking colon, though spastic. I plan to repeat this study at intervals and observe the progress.

Finally, just a few remarks on the subject in general. In the last analysis we do not know what causes cholecystitis or colitis. Besides a primary source of infection, metabolic, allergic or even neurological factors may be involved. Although Rehfuss has several times called attention to the association of these two conditions, practitioners in general do not realize that they commonly occur, possibly as independent but more often, I believe, as dependent entities. Which comes first there is at present no means of proving satisfactorily. We are coming more and more to look upon the chronic gastro-intestinal invalid as one in whom there is not only a localized infection in the appendix, gall bladder or any other separate portion of the tract, but as one who harbors a generalized infection involving the entire gut tube. More often than not in such cases, we are unable definitely to put our finger on the point where this infection began. I believe it is frequently the colon.

In patients with early intestinal tuberculosis but with no symptoms referable to the upper abdomen, I have repeatedly noticed striking tenderness along the liver edge when palpating high under the right costal margin. The significance of this finding I have never seen discussed.

Heyd's surgical and pathological work has shown that inflammation in the region of portal drainage is often associated with inflammatory changes in the liver and that this inflammation may extend from the liver to the gall bladder. Though the appendix is the most common source, there is no reason why the lymphatics of the intestine as a whole could not be a focus. These conditions must of course have a beginning and it is probable that further development of the Graham-Cole test, more detailed and better analyzed gastro-intestinal histories, and a clearer understanding of the obscure field of stool bacteriology which the Mayo workers are again opening up, will give us some light.

For the present, in a patient with colon symptoms, let us remember to consider the gall bladder as a possible focus, and in cases of cholecystitis let us not neglect a history, often easily obtained, of many years of disturbed bowel function.

Southern Medical Journal

JOURNAL OF THE
SOUTHERN MEDICAL ASSOCIATION

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $4.00. Single copies 35c each.

Entered as second-class matter at the Post Office at Birmingham, Ala., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1106, Act of October 3, 1917, authorized December 20, 1921.

DR. M. Y. DABNEY, Editor
C. P. LORANZ, Secretary-Manager

Vol. XXII FEBRUARY 1929 No. 2

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Third Annual Meeting
Miami, Florida
November 20-22, 1929

DR. CHARLES L. MINOR

IN MEMORIAM

A shadow on the twenty-second meeting of the Southern Medical Association, at Asheville last fall, was the absence of a distinguished Asheville citizen, ex-President Charles L. Minor, who has long been one of the best loved leaders of the Association. He was ill at the time in Washington, D. C. He recovered apparently soon afterward, returned to Asheville, and seemed in fairly good health, only to die suddenly of heart failure at his home shortly after Christmas, 1928.

Dr. Minor was born of an aristocratic Virginia family, in Brooklyn, New York, in 1865, was educated in New York City, at the University of Virginia, and abroad. He was intimately associated with the famous Viennese bacteriologist Klebs, to whose renowned book on "Tuberculosis" Dr. Minor contributed an important chapter. He was author of many scientific publications chiefly devoted to the study of tuberculosis, and ranked everywhere as an authority on the subject. He was President of the Southern Medical Association in 1924.

The Buncombe County Medical Society, Asheville, in passing resolutions upon the death of this great man and physician says:

"A man whose creed was supreme loyalty to his profession, whose practice was infinite care of every individual patient, whose talents and abilities were manifold, wide and wise, whose interests embraced active participation in the affairs of his beloved church and city, leaves a void not soon to be filled.

"Dr. Minor was honored and appreciated as well as loved, not only by the hundreds of devoted patients to whom in his long useful life he ministered; but so highly thought of was he by his professional brothers that he was the recipient of the highest honors that could be accorded him by his medical colleagues."

The life of Dr. Minor represents an important chapter in the study of tuberculosis in America. He was a true scholar, the type of man that one likes to think of as a Southern gentleman, who lived to work for the best interest of his city, his community, and his profession.

POSTERIOR PITUITARY LOBE EXTRACTS

In some directions research of the last few years has made a favorable start and the reader can scarcely keep up with its advances. In others, it reaches a blank wall and repeated bumping of one's head against the abstruse and difficult literature fails to yield any enlightenment compensating for the injury one has sustained.

In the first class may be placed the purification of physiologically active gland products, which has gone forward with steadily increasing momentum since the extraction of insulin from the pancreas by Banting and Best in 1922. The American Society for the Advancement of Science has recently presented its prize of $1000 to Oliver Kamm, of the Parke, Davis & Co. Laboratories, for "the most noteworthy contribution to science presented at the annual meeting."[1] The award rests upon the isolation by Kamm and his co-workers[2] of the physiologically active principles of the posterior pituitary lobe, and the settling thereby of a question which had long been undecided among pharmacologists. The method of isolation was first published in the *Journal of the American Chemical Society*, in February, 1928, since which time it has been confirmed at large, and the clinical value of the two principles has been ascertained.

In the 1928 edition of Cushney's "Pharmacology and Therapeutics"[3] it is said of the posterior pituitary extract:

"Authorities are not agreed as to whether the activity of the extract depends upon one principle or whether there are two or more present. . . . These principles act in minute doses, smaller than those of any known substance except perhaps the protein poisons."

The last statement is of interest, since pituitary principles active in much higher dilution are now available.

It has long been known that the posterior pituitary lobe extract possesses several activities: it stimulates uterine contractions (oxytocic effect, and hence its use in obstetrics); it raises the blood pressure (pressor effect); and it has a pronounced effect upon the excretion of urine, from which comes its well established usage in controlling the symptoms of diabetes insipidus. The United States Hygienic Laboratory and many distinguished pharmacologists have accepted the belief that all these effects were due to one active principle, and the method of assay of the "United States Pharmacopeia" depends upon mensuration of only one effect: the stimulation of contraction of isolated strips of uterine muscle of the virgin guinea pig. The Parke, Davis & Co. workers first developed a method of assay of the pressor activity of various samples of extract, by comparing the unknown with a standard to determine their elevation of the blood pressure of an anesthetized dog. The pressor activity was found to be very constant in the standard samples of pituitary extract obtained from the United States Hygienic Laboratory, though they had been tested there only for their oxytocic effect.

After the development of the test for pressor activity, it was possible to measure the steps by which it was enhanced, and those which diminished it, in treatment of the glands, and to obtain substances of high pressor and low oxytocic activity, or *vice versa*, in differently treated samples. A large number of glands of cattle were first extracted with water and a trace of acetic acid, and the extract concentrated at low temperature. Inactive proteins were separated by salt precipitation, and these further separated by addition of organic liquids such as acetone, ether, petroleum ether, and each fraction and precipitate tested for oxytocic and pressor activity. The final very active products, which were obtained in solid but not crystalline form and which appeared basic, were called *alpha* and *beta* hypophamines. On recombining the two separated principles, an extract with all the effects of the original pituitary extract was observed. Diuresis experiments on rabbits[1] indicated that the diuretic principle was identical with the purified pressor principle.

A number of clinical reports in the past year have further confirmed the separation of the two principles, the effect of the pressor principle in controlling the symptoms of diabetes insipidus, which condition is not affected by the oxytocic principle, and the effect of the oxytocic principle in stimulating uterine contraction. There is apparently no marked difference in the oxytocic action, that is the effect on the uterus, of oxytocin

1. New York World, Jan. 3, 1929.

2. Kamm, Oliver; Aldrich, T. B.; Grote, I. W.; Rowe, L. W.; and Bugbee, E. P.: Active Principles of the Posterior Lobe of the Pituitary Gland. Demonstration of Presence of Two Active Principles and Their Concentration in the Form of Potent Solid Preparation. Jour. Amer. Chem. Soc. 50: 573, Feb. 1928.

3. Cushny, A. R.: Pharmacology and Therapeutics. Ninth Ed., Lea & Febiger, Philadelphia, 1928.

1. Bugbee, E. P.; and Simond, A. E.: Diuretic-antidiuretic Effect of Pressor Principle of Posterior Lobe of Pituitary Gland. Amer. Jour. Physiol., 86:171, Aug., 1928.

and pituitary extract.[1] Oxytocin fulfills all obstetric requirements and has been particularly recommended in obstetric cases with high blood pressure, as in toxemia and eclampsia. Vasopressin is recommended for surgical shock to raise the blood pressure, and in diabetes insipidus, where it may be given hypodermically or with intranasal pledgets.[2]

The separation and purification of the two active principles enables the physician to foretell more accurately than heretofore the effect of prescribed medication, and furnishes him with more dependable instruments of therapy. It will be worth his while to acquaint himself with the two, that he may estimate for himself their relative values and the cases in which to employ them.

CALCIUM RESERVE

There is little in medical literature about storage of the mineral materials essential to growth and maintenance. Calcium, for instance, leaves the body daily at the rate of about 0.32 gram,[3] which must be supplied from a varying and frequently inadequate dietary. That there is a calcium reserve in the body normally, like the protein reserve and carbohydrate reserve, is asserted by Bauer, Aub, and Albright,[4] who have studied the conditions under which it is stored away or depleted, and the location of the mobilizable supply. They believe that the trabeculae of bone, which are more numerous at the epiphyseal ends of the bone where the blood supply is greatest, serve as depots of storage for a supply of calcium available for daily needs.

A large number of animals were used in the study of the hypothesis. A litter of eight rabbits was taken to determine the effect of parathormone, a parathyroid extract, upon calcium deposition. Bones of the animals which received extract were found to contain much less calcium than those of the controls, and this was most marked in the trabeculae.

Adult cats were kept for a period on a low calcium diet and a foreleg amputated under ether and examined. They were then placed on a high calcium diet and later sacrificed. In the specimens after the low calcium diet, very few trabeculae were seen; after the high calcium diet, there were many, where presumably the excess calcium was deposited.

In vital staining it has been noted that alizarin red, administered either orally or intramuscularly, will stain newly deposited bone and not old bone. This dye was then injected into animals to show that on a high calcium diet calcium is newly deposited in the trabeculae of the bones. This was very clearly demonstrated.

Adult cats were kept first on a low calcium diet, then on a high with simultaneous alizarin red injections. After varying periods of the high calcium diet they were killed and the bones examined. The first animals killed showed a few faintly stained trabeculae. Those killed after two months all had many red-stained trabeculae.

Cats which had been kept for months on a high calcium diet received alizarin red also for a period. Upon examination they were observed to have many trabeculae, but none had taken the stain. Presumably they had been formed during the long period of the high calcium diet. At the time of administration of the dye the animals were in calcium equilibrium, no new bone was being formed, no calcium stored, and therefore there was no staining. Calcium is not stored in unlimited amounts. On a high calcium diet it is stored to a certain extent. On a low calcium diet it is not stored, but the available supply is depleted, and it is not usually stored during the administration of parathormone.

It has been indicated that infants at birth have a store of calcium which allows normal bone growth during the first four months of life. The authors inquire whether this reserve supply is in the bone trabeculae. The ratio of calcium to body weight in normal infants diminishes during the first four months. The excess store of the fetus is deposited during the last months of pregnancy, so that premature infants are without it. Normal infants delivered at term do not get rickets till they are four months old. Premature infants develop it early.

To determine the source of calcium supply of growing animals, nursing kittens were killed at varying intervals after birth. The shafts of the bones were found at first to be full of trabeculae. The number of these steadily diminished as the

1. Ward, G. G.; Lyon, E. C., Jr.; and Bemer, G. G.: Clinical Results Obtained with Oxytocin and Vasopressin, the Recently Isolated Principles of the Pituitary Gland. Amer. Jour. Obst. and Gyn., 16:655, Nov., 1928.

2. Gargle, S. L.; Gilligan, D. R.; and Blumgart, H. L.: Effect of Oxytocic and Pressor Principles of Extract of Posterior Lobe of the Pituitary Gland. New Eng. Jour. Med., 198:169, Mar. 15, 1928.

3. Mathews, A. P.: Physiological Chemistry. Fourth ed., p. 886. New York: William Wood & Co., 1925.

4. Bauer, W., Aub, J. C., and Albright, F.: Studies of Calcium and Phosphorus Metabolism V. Study of Bone Trabeculae as a Readily Available Reserve Supply of Calcium. Jour. Exp. Med., 49:145, Jan., 1929.

kittens grew and as the supply of stored calcium decreased. Normal nursing kittens were allowed to continue nursing and were given alizarin red injections for a period to determine where the new bone was being laid down. All the teeth became pink by the thirtieth day except the tips. When the kittens were three months old the bone cortex was stained red, indicating new bone formation. Adult cortex under the same conditions is white, for very little calcium is deposited in the cortex of adult bone.

Thus it was shown experimentally that under conditions which favor calcium storage the number of trabeculae in the bones increases and fresh calcium is deposited in them. When the animal receives insufficient calcium in his diet, or under the influence of parathormone injection, calcium is not deposited and the number of bone trabeculae diminishes. The bone shafts which are of great importance to body structure are protected from depletion by the storehouse of available calcium in the trabeculae. In great need, as during rickets or osteomalacia, the shafts have to relinquish calcium. It is significant that osteomalacia occurs after heavy calcium drainage from the body, as after repeated pregnancies.

Surgeons have for some time been aware of the importance of a normal quantity of blood calcium to fracture healing; obstetricians of its importance in the dietary of pregnancy. The recent great popularity of milk as a food is based upon its high content of available calcium, a mineral in which the average American dietary is deficient. It is worthy of some pains to ascertain that during a period of abundant calcium supply this material may be stored in the body in a mobilizable form against later calcium famine.

Book Reviews

Lister as I Knew Him. By John Rudd Leeson, Dresser, Clerk and Medallist, M.D., C.M., Edin., M. R.C.S., J. P. Middx., F.L.S., F.R.A.S., Senior Consulting Physician, St. John's Hospital, Twickerham; Late Demonstrator of Anatomy, St. Thomas' Hospital. 212 pages. New York: William Wood & Co. Cloth, $3.50.

This is an engaging biography of the discoverer of antisepsis, ably done by one who was his hospital assistant and pupil.

Ultra-Violet Radiation and Actinotherapy. By Eleanor H. Russell, M.D., B.S., Dunelm, Honorary Physician Sun-Ray Clinic, Newcastle-on-Tyne, and W. Kerr Russell, M.D., B.S., Dunelm, Medical Director Sun-Ray Clinic, Newcastle-on-Tyne, Goyder Scholar, University Durham, 1914. Third Edition. 648 pages, illustrated. New York: William Wood & Co., 1928. Cloth, $6.50.

The volume epitomizes the modern tendencies in the treatment of certain diseases by ultra-violet radiation. This form of treatment was placed on a scientific basis by the work of Finsen, who announced in 1893 the result of the successful treatment of tuberculosis of the skin by means of "Finsen light." Since this pioneer work, much progress has been made in the application of ultra-violet light to various systemic as well as local diseases.

The opening chapters give a brief historical review of ultra-violet therapy. The nature of radiant energy, the technic of application of light and the various forms of artificial light are discussed in great detail in the first chapters. There is a comparative study of the benefits derived from the use of artificial and natural sunlight on tuberculosis. The chapter on nutritional disorders is especially inviting on account of the case histories and accompanying x-rays.

In the pages dealing with angina pectoris, hypertension, primary anemia and various endocrin disorders, much is said which can be refuted. The good results obtained in these cases might have been due just as well to rest, fresh air or diet. Despite the over-enthusiasm of the authors, the book as a whole is useful. It is abundantly illustrated.

Roentgenology. Its Early History, Some Basic Physical Principles and the Protective Measures. By G. W. C. Kaye, O.B.E., M.A., D.Sc., F.Inst.P. 157 pages with 49 illustrations. New York: Paul B. Hoeber, Inc., 1928. Cloth, $2.00.

The subject is presented in nine chapters and two appendices. The first chapter gives a resume of the early history of radiology. Chapters 2-6, inclusive, are devoted to the physics of refraction and reflection of x-rays. Since part of this section of the book was presented as the Caldwell Lecture before the American Roentgenological Society, it, at times, becomes too technical to be followed in detail by the average physician.

Chapters 7, 8 and 9 emphasize the importance of x-ray protection, give values of various protective substances, and also the author's recommendation for minimum requirements for safe working conditions with this form of energy.

Chapter 10, "The Future of Roentgenology," is a brief summary of the author's advice as to the necessary precautions to be followed in order that x-ray should progress to its fullest usefulness.

Appendix A is a detailed report giving the "Recommendations of the British X-Ray and Radium Protection Committee."

Appendix B gives the "Recommendations Adopted at the Second International Congress of Radiology in Stockholm, in 1928."

The detailed information and clearness of expression in these two appendices make the book one that should be of constant application. There is a complete bibliography of the subjects related to the text.

Exercitation Anatomica de Motu Cordis et Sanguinis in Animalibus. By William Harvey, M.D., with an English Translation by Chauncey D. Leake, Professor of Pharmacology, University of California. Tercentennial Edition. Springfield, Illinois, and Baltimore, Maryland: Charles C. Thomas, 1928. Cloth, $3.50.

This tercentennial edition of Harvey's great work on the circulation of the blood is an addition to one's historical library. The original Latin manuscript is reproduced in the first half of the book. Dr. Leake has also produced a new translation, in a smooth, easy English of today. In it the development of the proof of Harvey's view of the motion of the blood is very readily followed.

Aside from the scientific and literary value of the book, this edition is printed on handsome paper and the binding is a work of art.

Laboratory Manual of the Massachusetts General Hospital. By Roy R. Wheeler, M.D., and F. T. Hunter, M.D. Second edition, enlarged and thoroughly revised. 101 pages. Philadelphia: Lea & Febiger, 1928.

The chapter headings give some idea of the scope of the book: Laboratory Work Indicated; Examination of Specimens; Collection of Specimens; Special Diagnostic Procedures; Therapeutic Technique; Prophylactic Measures; Appendix and Index. Primarily intended for internes at the Massachusetts General Hospital, its usefulness was soon recognized by other modern hospitals and by practitioners who wished to check up on their technic and also have a ready reference for common procedures employed in an up-to-date hospital.

The Treatment of Diabetes Mellitus. By Elliott P. Joslin, M.D. (Harvard), M.A. (Yale), Clinical Professor of Medicine, Harvard Medical School; Consulting Physician, Boston City Hospital; Physician to New England Deaconess Hospital. Fourth Edition, Enlarged, Revised and Rewritten. 998 pages, illustrated. Philadelphia and New York: Lea & Febiger, 1928. Cloth, $9.00.

This book is a classic and no physician who treats diabetic patients can afford to be without it. The present new edition is thoroughly revised. The section on insulin is very complete. The discussion of surgical disorders in diabetes is excellent. The section dealing with diet is as good as ever, which is to say that it is the best in the English language.

Local Anesthesia. By Geza de Takats, M.D., Assistant Professor of Surgery, Northwestern University School of Medicine, Chicago, Illinois, with an introduction by Allen B. Kanavel, M.D., Professor of Surgery, Northwestern University Medical School. Octavo of 221 pages with 177 illustrations. Philadelphia and London: W. B. Saunders Co., 1928. Cloth, $4.00.

Now that local anesthesia in its various forms is enjoying a great wave of popularity throughout the Country, a number of works on the subject are coming from the press. Its field of usefulness is rapidly widening and he who ignores it must surely fall behind.

This book gives the most accepted methods of the present day. It is well illustrated with anatomical diagrams and dissections, so necessary to the proper teaching of this particular subject. The book is one of the best along this line that has appeared.

Technic of Contraception. The Principles and Practice of Anti-Conceptional Methods. By James F. Cooper, M.D., Medical Director of the Clinical Research Department of the American Birth Control League; Formerly Professor of Clinical Surgery, Foochow Union Medical College, Foochow, China; and Clinical Instructor in Obstetrics, Boston University Medical School. 271 pages, illustrated. New York: Day-Nichols, Inc., 1928. Cloth, $8.00.

The physician who desires practical information upon birth control could probably secure what he needed from a two-page pamphlet. However, it is very difficult to obtain reliable pamphlets upon the subject on account of the many state laws against dissemination of information on the subject. Many physicians are unable to supply the fundamental facts to patients whose physical condition makes them severely in need of them. This is due also to a neglect of the subject in medical colleges and in works on obstetrics and gynecology.

The book deals first with the opinions of a number of well known men on this subject, with the arguments for and against voluntary regulation of the birth rate, and with the medical conditions in which it is deemed necessary. Practically all the methods of birth limitation in use in different parts of the world are described and evaluated, both harmful and harmless methods. Means of permanent sterilization are given briefly. Most space is devoted to the various temporary methods in vogue. An apparently simple and reliable technic, described as new for America, is given and recommended.

An epitome of state laws on dissemination of information concerning methods of birth control closes the volume, which has also four and one-half pages of bibliography.

The volume is valuable on account of the apparent dearth of medical literature on the technic of birth control. It is in large print and not difficult to read. It advocates and describes an available simple, harmless method, and gives apparently reliable statistical data to support its statements. It is sold to physicians only.

An Index of Differential Diagnosis of Main Symptoms. By Various Writers. Edited by Herbert French, C. B.D. (Military), M.A., M.D. Oxon., F.R.C.P. Lond., Physician to H. M. Household; Physician and Lecturer, Guy's Hospital; Consulting Physician to Queen Alexandra's Military Hospital, Millbank. Fourth Edition. 1171 pages with 701 illustrations. New York: William Wood & Co., 1928. Cloth, $18.00.

This work, really encyclopedic in extent, is a wonderful compilation from some twenty English authors. The arrangement is good and the illustrations, which are numerous, are clear and distinct.

It is difficult to review in any detail so massive a work, but some idea may be conveyed of the actual arrangement and treatment of the subjects. The main symptoms, usually given by their common or every-day names, are arranged alphabetically in large black face type to catch the eye easily, and under such a heading the subjects are in smaller black face type or italics.

Apparently an earnest effort has been made to condense to the utmost extent consistent with clearness. This is not objectionable, for the basis on which the differentiation has been made is given, and the reader can then refer to works on the particular subject for details of further signs and symptoms and for treatment, for no treatment is given in this work. The ed-

itor, Herbert French, has painstakingly followed the title of the book and has not allowed himself or his collaborators to go beyond the "differentiation" of main symptoms.

Many color plates are used where color is important in the differential diagnosis, particularly of skin eruptions.

An index of more than 200 pages of fine type adds greatly to the convenience of the book as a reference.

Clinical Medicine. By Oscar W. Bethea, M.D., Ph.G., F.C.S., F.A.C.P., Professor of Therapeutics, Tulane Graduate School of Medicine; Professor of Clinical Therapeutics, Tulane School of Medicine; Chief of Medicine, The Baptist Hospital, New Orleans; Senior Visiting Physician, Charity Hospital of Louisiana; Medical Director of the Standard Oil Company of Louisiana. Octavo volume of 700 pages. Philadelphia and London: W. B. Saunders Company, 1928. Cloth, $7.50.

The author states that his aim is to supply a book which will be of particular value in the care of patients in their homes, rather than in hospitals. As regards treatment, he has succeeded well in his purpose,—in the section on infectious diseases, particularly admirably. The section on treatment of influenza will be found exceptionally useful this year.

The book should be of particular value to the general practitioner. There is not extensive correlation of disease symptoms and diagnosis with physiology and pathology, as it is written with a different aim.

The tone of the book is conservative. It is "old-fashioned" throughout, but in a day of "new-fangledness", this may well be a virtue. It will serve a very useful purpose in bedside diagnosis and treatment. It presents much needed clinical facts in the most available manner for the practising physician.

Modern Medicine: Its Theory and Practice. By Sir William Osler, Bart., M.D., F.R.S., Late Regius Professor of Medicine in Oxford University, England; Honorary Professor of Medicine in the Johns Hopkins University, Baltimore; Formerly Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia, and of the Institute of Medicine in McGill University, Montreal, Canada. Third Edition, Thoroughly Revised. Re-edited by Thomas McCrae, M.D., assisted by Elmer H. Funk, M.D. Volume VI. 964 pages, illustrated. Philadelphia and New York: Lea & Febiger, 1928. Cloth, $9.00.

Volume VI of "Osler's Modern Medicine," dealing with "Diseases of the Nervous System—Diseases and Abnormalities of the Mind," is a work of 964 pages, or slightly larger than the average full text book on the subject. Its twenty-five chapters are written by twenty different authors who were chosen because of their particular talents. Many of them are authors of text books on neurological subjects. Some of the contributors are Llewellys F. Barker,, William G. Spiller, Edwin Bramwell, Harvey Cushing, Sir E. Farquhar Buzzard, Smith Ely Jeliffe, B. Sachs, and others.

The assignments are such as to form a correlated and rather exhaustive compilation of neurologic and psychiatric knowledge of the day. McCrae's present edition is a worthy descendant of the system originally edited by the late Sir William Osler.

Sterility in Women: Diagnosis and Treatment. Sidney Forsdike, M.D., B.S. (Lond.), F.R.C.S. (Eng.) and (Edin.), Surgeon to the Hospital for Women, Soho Square, London Gynecological Surgeon to the Kensington, Fulham and Chelsea Hospital; Consulting Gynecologist to the Hammersmith Hospital; Jacksonian Prizeman, Royal College of Surgeons of England; Late Hunterian Professor of the Royal College of Surgeons of England. 133 pages with 25 illustrations, including 17 plates. New York: William Wood & Co., 1928. Cloth, $3.50.

This short monograph of 133 pages by an Englishman, Forsdike, recounts an extensive experience and covers most of the important literature, but necessarily is quite brief in spots. For example, he touches upon McComber and Reynolds' sterility studies in vitamin deficiencies in rats, but he does not include important recent work which shows in rats that a deficiency of vitamin A prevents implantation of the fertilized ovum in the uterus and that a lack of vitamin E is followed by resorption of the embryo in the female and testicular degeneration in the male.

The JOURNAL's readers will probably be interested in this excerpt in connection with the harmful results of certain contraceptive measures: "Being of American stock, she was very up to date and had what is known as the gold button introduced into the cervix," etc. Our English friend forgets that statistics will show that the average American family is larger than that of his countrymen, and that over here a large part of the population with ax and plow was supporting families of eight, ten, twelve or more children at a time when Europeans were past masters in the art of contraception.

To digress upon a matter purely of archaic English, those on this side of the water will be struck by the expression:

"A narrowing of the vaginal entrance, * * * * * * if successful, must necessarily worsen the condition * * * * * *."

The reviewer has encountered no work on sterility so modern or good as Forsdike's, and the sole valid criticism that can be made of it is that it is at times too condensed.

Urology. By Edward L. Keyes, M.D., Ph.D., F.A.C.S., Professor of Urology, Cornell University Medical College; Urologist to St. Vincent's Hospital; Consulting Urologist to Bellevue and the Memorial Hospitals, Etc. 763 pages, illustrated with 184 illustrations and 20 plates. New York: D. Appleton & Co., 1928.

Keyes' "Urology" has been rewritten so differently and has been adorned with such an entirely new set of illustrations that it would find difficulty in claiming any kinship whatever with the various former works of this author.

All the modern advances are indicated. Incidentally Keyes possesses the rare combination of a good urologist and clever author, and his book is a worthy product of that union of virtues. Its size and scope are such as to render it suitable both for a text book for students and a reference work for urologist and practitioner.

Books Received

The following books have been recently received. In a later issue reviews of some of these will appear. The JOURNAL accepts no obligation to the publishers beyond this public acknowledgment of receipt of the book.

Bacteriology, General Pathological and Intestinal. By Arthur Isaac Kendall, B.S., Ph.D., Dr.P.H., Professor of Research Bacteriology in the Northwestern University Medical School, Chicago, Illinois. Third Edition. Thoroughly Revised. 733 pages, illustrated with 103 engravings and 8 plates. Philadelphia: Lea & Febiger, 1928. Cloth, $7.00.

Syphilis. Charles C. Dennie, B.S.M.D., Assistant Professor of Dermatology and Syphilology, University of Kansas School of Medicine. 304 pages, illustrated. New York and London: Harper & Bros., 1928. Cloth, $2.50.

The Genesis of Epidemics and the Natural History of Disease. By Clifford Allchin Gill, Lieutenant-Colonel, Indian Medical Service, Director of Public Health, Punjab, M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.P.H. (Eng.), D.T.M.&H. (Eng.). 550 pages, illustrated. William Wood & Co., 1928. Cloth, $6.50.

The Validity of the Appraisal Form as a Measure of Administrative Health Practice. By Philip S. Platt, Yale University, B.A., M.A., Ph.D., Harvard-Technology School of Public Health, C.P.H. 101 pages. New York: American Public Health Association, 1928. Cloth, $1.50.

Physical Education Activities for High School Girls. By the Staff of the Department of Physical Education for Women, University of Michigan, Ann Arbor, Michigan. 322 pages, illustrated with 54 engravings. Philadelphia: Lea & Febiger, 1928. Cloth, $3.50.

Neurological Examination. An exposition of tests with interpretation of signs and symptoms. By Charles A. McKendree, M.D., Associate, Department of Neurology, College of Physicians and Surgeons, Columbia University. With a foreword by Henry Alsop Riley, M.D. 12 mo of 280 pages with 88 illustrations. Philadelphia and London: W. B. Saunders Company, 1928. Cloth, $3.25 net.

Text-Book of Urology. By Daniel N. Eisendrath, M.D., Attending Urologist Michael Reese and Chicago Memorial Hospitals; Assistant Professor of Surgery (Genito-Urinary), Rush Medical College of the University of Chicago, and Harry C. Rolnick, M.D., Associate Urologist Mt. Sinai Hospital. 942 pages with 700 black and white illustrations and 11 in color. Philadelphia and London: J. B. Lippincott Company. Cloth, $9.00.

Applied Bacteriology for Nurses. By Jean Martin White, R. N., Instructor in Sciences, School of Nursing of St. Mark's Hospital, New York City; formerly Visiting Instructor, Schools of Nursing, of Bellevue and Harlem Hospitals, New York City. 200 pages. New York: The Macmillan Co., 1928.

Roentgenology, The Borderlands of the Normal and Early Pathological in the Skiagram. By Alban Kohler, Prof. Dr. med., Wiesbaden, Ex-President of the German Roentgen Society. Member of the Executive Committee of the Society of German Scientific and Medical Researchers. 556 pages, illustrated. New York: William Wood and Company, 1928. Cloth, $14.00.

International Clinics. Volume IV. Thirty-Eighth Series, December 1928. By leading members of the medical profession throughout the world. 312 pages, illustrated. Philadelphia and London: J. B. Lippincott Company, 1928.

Diabetic Surgery. By Leland S. McKittrick, M.D., F.A.C.S., Visiting Surgeon, Palmer Memorial Hospital; and Howard F. Root, M.D., Assistant Physician, New England Deaconess Hospital; With a foreword by Daniel F. Jones, M.D., and Elliott P. Joslin, M.D. 269 pages with 79 engravings and 2 colored plates. Philadelphia: Lea and Febiger, 1928. Cloth, $4.25.

The Medical Record Visiting List or Physicians' Diary for 1929. Revised. New York: William Wood and Company. $2.00 net.

Acute Infectious Diseases. By Jay Frank Schamberg, A.B., M.D., Professor of Dermatology and Syphilology in the Graduate School of Medicine, University of Pennsylvania; and John A. Kilmer, M.Sc., M.D., Dr.P.H., D.Sc., LL.D., Professor of Pathology and Bacteriology in the Graduate School of Medicine of the University of Pennsylvania. Second Edition, thoroughly revised. 888 pages illustrated with 161 engravings and 27 full-page plates. Philadelphia: Lea & Febiger, 1928. Cloth, $10.00 net.

A Text-Book of Surgical Diagnosis. Volume I and II. Edited by A. J. Walton, M.S., F.R.C.S., B.Sc., M.D. 1121 pages, illustrated. New York: William Wood and Company, 1928. Cloth, for the two volumes, $20.00.

The Clinical Examination of the Nervous System. By G. H. Monrad-Krohn, M.D., F.R.C.P., Professor of Medicine in the Royal Frederick University, Oslo; with a foreword by T. Grainger Stewart, M.D., F.R.C.P. Fourth Edition. 12 mo. 225 pages with 55 illustrations. New York: Paul B. Hoeber, Inc., 1928. Cloth, $2.50.

Spasmophilia. By Edward C. Wrightsman, M.D., former Clinical Assistant in Pediatrics, Northwestern University Medical School, Chicago. 155 pages, illustrated. Boston: Richard G. Badger, Publisher, 1928.

What is Life? By Augusta Gaskell. Introduction by Karl T. Compton, Professor of Physics, Princeton University and Raymond Pearl, Professor of Biology, The Johns Hopkins University. 324 pages. Springfield, Illinois: Charles C. Thomas, Publisher, 1928.

Qualitative and Volumetric Analysis. By H. Lambourne, M.A., M.Sc., F.I.C., Head of the Chemistry Department, the Polytechnic Regent Street, W.1, and J. A. Mitchell, M.Sc., Lecturer in the Chemistry Department, The Polytechnic Regent Street, W.1. 51 pages. New York: Oxford University Press, 1928. Cloth, $1.50.

Lipiodol in the Diagnosis of Thoracic Disease. By F. G. Chandler, M.A., M.D. (Cantab.), F.R.C.P. (Lond.), Physician with Charge of Out-Patients, Charing Cross Hospital, and W. Burton Wood, M.A., M.D. (Cantab.), M.R.C.P. (Lond.), Physician with Charge of Out-Patients, City of London Hospital for Diseases of the Heart and Lungs, Victoria Park, E. 133 pages, illustrated. New York: Oxford University Press, 1928. Cloth, $3.50.

Methods of Biological Assay. By J. H. Burn, M.A., M.D. (Camb.), Director of the Pharmacological Laboratory of the Pharmaceutical Society of Great Britain. With an introduction by H. H. Dale, C.B.D., Sec. R.S., M.D., F.R.C.P. 126 pages, illustrated. New York: Oxford University Press, 1928. Cloth, $2.55.

A Handbook for the Diabetic. By Albert H. Rowe, B.S., M.D., Oakland, California. 129 pages. New York: Oxford University Press, 1928. Cloth, $2.50.

Treatment of Venereal Disease in General Practice. By E. T. Burke, D.S.O., M.B., Ch.B. (Glas.). 162 pages. New York: Oxford University Press, 1927. Cloth, $1.75.

Child Health and Character. By Elizabeth M. Sloan Chesser, M.D., 204 pages. New York: Oxford University Press, 1927. Cloth, $1.50.

Blood: A Study in General Physiology. By Lawrence J. Henderson, Professor of Biological Chemistry in Harvard University. 397 pages, with more than two hundred illustrations. New Haven, Connecticut: Yale University Press, 1928. Cloth, $5.00.

International Clinics. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pediatrics, Obstetrics, Gynecology, Orthopedics, Pathology, Dermatology, Ophthalmology, Otology, Rhinology, Laryngology, Hygiene and Other Topics of Interest to Students and Practitioners. Edited by Henry W. Cattell, A.M., M.D., Philadelphia, U.S.A., with collaboration of others. Volume II and Volume III, Thirty-Eighth Series, 1928. 310 pages, illustrated. Philadelphia and London: J. B. Lippincott Co., 1928.

Methods and Problems of Medical Education. Tenth Series. 337 pages, illustrated. New York: The Rockefeller Foundation, 1928.

The Rockefeller Foundation Annual Report, 1927. 385 pages. New York: The Rockefeller Foundation.

The Daily Health Builder. By C. Ward Crampton, M.D. 161 pages, illustrated. New York and London: G. P. Putnam's Sons, 1928. Cloth, $1.50.

Annual Reprint of the Reports of the Council on Pharmacy and Chemistry of the American Medical Association for 1927. 103 pages. Chicago: American Medical Association, 1928. Cloth, $1.00.

Chemistry in Medicine. Edited by Julius Stieglitz, Professor of Chemistry, University of Chicago. 757 pages. New York: The Chemical Foundation, Inc., 1928. Cloth, $2.00.

Annual Report of the Surgeon General of the Public Health Service of the United States for the Fiscal Year 1928. 346 pages. Washington: United States Government Printing Office, 1928.

Southern Medical News

ALABAMA

The Samuel Wallace Welch Memorial Scholarship Fund has been organized by the friends of the late Dr. Samuel Wallace Welch, former State Health Officer. The purpose of this organization is to provide scholarships and funds to deserving students who wish to study medicine. Anyone wishing to make a contribution to this fund should mail a subscription to Mr. S. C. Oliver, Chairman, Talladega.

The Pike County Medical Association recently elected Dr. J. M. Watkins, Troy, President; Dr. T. D. McKnight, Brundidge, Vice-President; Dr. T. D. Cowles, Troy, Treasurer; Dr. W. H. Abernethy, Troy, Secretary; and Dr. W. S. Sanders, Troy, Censor.

At their meeting in December the Dallas County Medical Society elected Dr. P. B. Moss, Selma, President; Dr. R. L. Sutton, Orrville, Vice-President; Dr. L. T. Lee, Selma, Secretary; Dr. George Edmonds and Dr. P. Y. Donald, Selma, to the Board of Censors.

The Huntsville Hospital was recently bequeathed $1,000 by the late Mrs. Bettie Goldsmith for the maintenance of the Henrietta Bernstein room.

Dr. Jacques Henry Baumhauer, Jr., of Mobile, was married on October 12 to Miss Janet Westgate Beebower, of Chester, Penna.

Dr. Arthur H. Graham, Wetumpka, former head of the Elmore County Health Unit, has been promoted to District Health Officer of Southeastern Alabama, composed of nineteen counties.

Dr. Lewis Roy Poole, Dothan, has been appointed Head of the Elmore County Health Unit.

Dr. R. A. Burns, Montgomery, has been appointed Warden of Kilby Prison. He will continue his work as Physician Inspector of State Prisons.

The people of Birmingham are drinking more milk. The records of the City Health Department show that during the year ending December 31, 1928, the City of Birmingham consumed an average of 12,675 gallons of milk daily.

On January 15th the new Hillman Hospital, Birmingham, was formally opened with a reception and inspection of the building. This building is modern in every respect, five stories, brick, fire-proof and every equipment necessary for the maintenance of a hospital has been added.

Deaths

Dr. Abram Walter Trigg, West Blocton, aged 75, died October 4 of cerebral hemorrhage.

Dr. Carl Rubach, Evergreen, aged 62, died October 16 of cerebral hemorrhage.

Dr. Frederick Arthur Belo, Evergreen, aged 90, died October 30.

Dr. William Tell Wise, Cooper, aged 61, died November 25 following an operation.

Dr. Samuel William May, Brantley, aged 70, died October 29.

ARKANSAS

A number of Arkansas physicians met at Little Rock on November 10 for an all-day clinic which was sponsored by Dr. F. W. Carruthers and was held in honor of Dr. Wm. R. Bathurst, former President of the Southern Medical Association. At this meeting a movement was started looking toward the formation of an organization that will hold monthly medical and surgical clinics.

Ashley, Drew and Chicot Counties, under the auspices of the United States Public Health Service, held a special clinic on November 24 at Hamburg. Seventy-five cases were examined and it was one of the largest clinics ever held in this section of the Country.

The Craighead County Medical Society, at its meeting on December 6, elected the following officers: Dr. R. H. Willett, Jonesboro, President; Dr. W. C. Overstreet, Jonesboro, First Vice-President; Dr. L. H. McDaniel, Tyronza, Second Vice-President; Dr. H. H. McAdams, Jonesboro, Treasurer; Dr. Thad Cothern, Jonesboro, Secretary; and Dr. Wm. Howard Smith, Bono, Censor.

Dr. Robert P. Harris, Little Rock, was recently appointed Superintendent of the County Hospital.

Dr. C. McA. Wassell, Little Rock, has been appointed County Health Officer.

Dr. Robert Caldwell, Little Rock, was re-elected Chief of Staff of St. Vincent's Infirmary at its recent staff meeting.

The Southwestern Branch of the American Urological Association met in Hot Springs December 7 and 8. Dallas, Texas, was chosen for the meeting in 1929.

Dr. G. A. Warren, Black Rock, was elected Deputy Grand Master of the Masonic Grand Lodge of Arkansas at the recent meeting held in Little Rock.

At the December meeting of the Pulaski County Medical Society, Dr. Homer Scott, Little Rock, was elected President; Dr. Chas. C. Reed, Little Rock, Vice-President; Dr. Ernest Harl White, Little Rock, Secretary; Dr. Wm. R. Bathurst, Little Rock, re-elected as Treasurer; and Dr. R. J. Calcote, Little Rock, member Board of Censors.

Dr. F. L. Husbands, Blytheville, was elected President of the Mississippi County Medical Society at the recent meeting; Dr. T. F. Hudson, Luxora, Vice-President; Dr. F. D. Smith, Blytheville, re-elected Secretary; Dr. R. L. Johnson, Bassett, Censor; Dr. C. E. Wilson, Blytheville, retiring President, was named as Delegate to the annual meeting.

Deaths

Dr. David Taylor Johnson, Fort Smith, aged 81, died November 4 of myocarditis.

DISTRICT OF COLUMBIA

The Department of Interior has announced that work will soon begin on the new hospital which will be one of St. Elizabeth's Hospital group, Washington. This will be one of a group of 120 buildings and will be devoted to the medical and surgical treatment of patients. It will have 200 beds and the most modern equipment obtainable. Congress authorized $875,000 expenditure for this hospital.

Senior Surgeon L. L. Lumsden, Washington, has been directed to visit St. Louis, Missouri, and such

(Continued on page 36)

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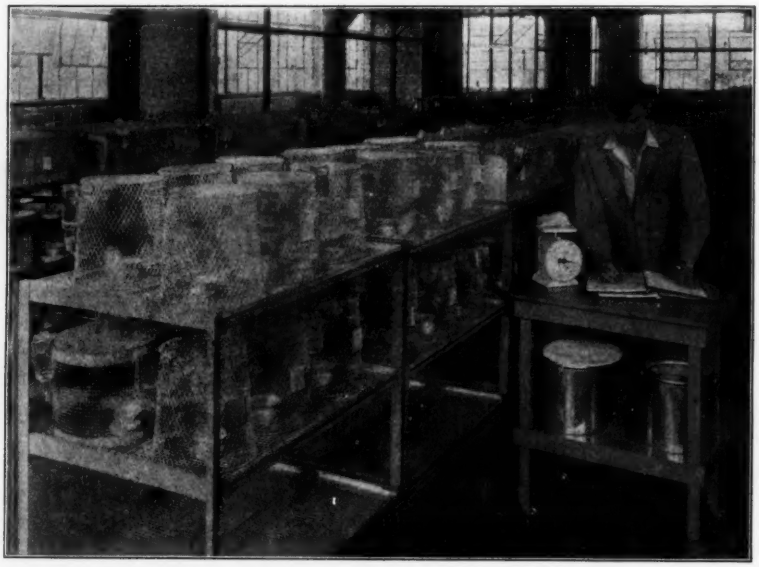

The Chemist and the Fisherman Get Together

In Massachusetts the codfish is a state emblem, symbolic of the great fishing industry. It was logical, therefore, that the Patch laboratory, located in Massachusetts, should be a leader in research on American cod liver oil.

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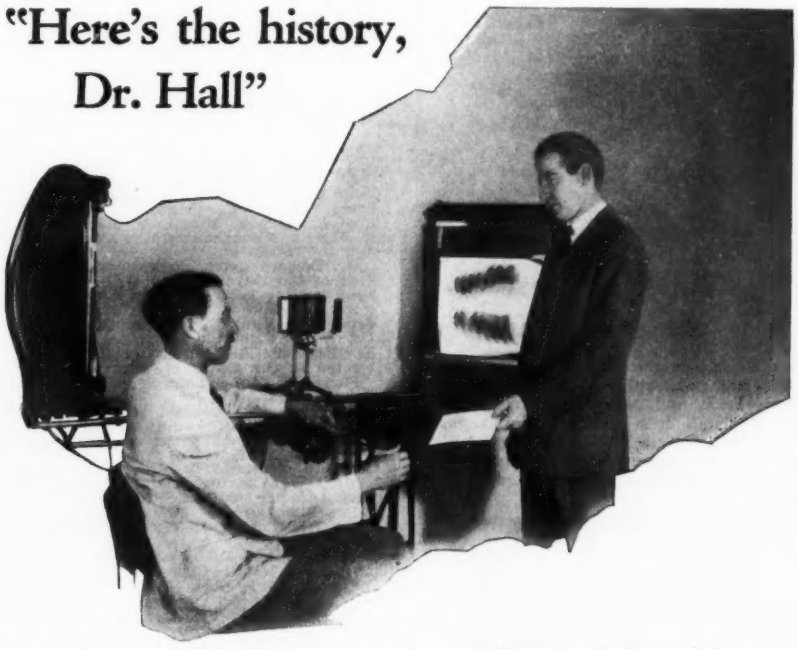

When you have a case for which x-rays are indicated, send the case history to the roentgenologist to whom you refer your patient. Then you may expect a thorough diagnosis. There is much to be gained by the physician and roentgenologist working together. Interpretations will then be based on *all* the information available.

X-rays are not a complete examination but confirm or refute other findings. X-rays are often necessary but taken alone are not always conclusive. In other words, when the x-ray indicates trouble, there are generally other findings to check it. Let your roentgenologist have the full benefit of the case record.

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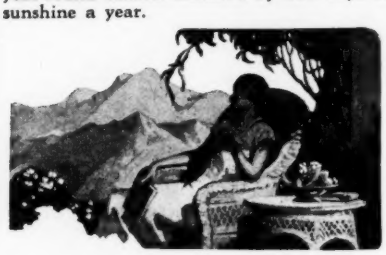

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(Continued from page 200)

other places in the states of Missouri, Arkansas, Tennessee, Georgia, Alabama and Louisiana as may be necessary in connection with rural sanitation studies.

Dr. Ernest D. Davis, Jr., Lieut., U. S. Navy, Washington, was married to Miss Harriet Clarke, of Covington, Virginia, in October.

Deaths

Dr. Joseph O. Reed, Washington, aged 75, died October 27.

FLORIDA

At the annual meeting held early in December the Dade County Medical Society elected the following officers: Dr. C. D. Cleghorn, Miami, President; Dr. Roy J. Holmes, Miami, Vice-President; Dr. Robert M. Harris, Miami, Secretary; and Dr. C. E. Dunaway, Miami, Treasurer.

Dr. Edward Jelks, Jacksonville, was elected President of the Duval County Medical Society at the annual meeting held December 4. Other officers elected were: Dr. Luther Holloway, Jacksonville, Vice-President; Dr. Kenneth Morris, Jacksonville, Secretary; Dr. W. M. Shaw, Jacksonville, Treasurer; and Dr. S. E. Driskell, Jacksonville, retiring President, was elected to the Board of Governors.

Dr. R. F. McLeod, formerly of Greenwood, recently moved to Madison.

St. Vincent's Hospital, Jacksonville, is to have a memorial bulkhead built around the Hospital property, facing St. Johns River. This was voted by the Woman's Auxiliary of the Hospital at their last monthly meeting.

Dr. W. A. Claxton, Miami, has resigned as Assistant City Director of Public Welfare.

Dr. Blackburn W. Lowry, Tampa, was married to Miss Helen Jean Heffron, of Sewickley, Penna., on October 27.

Dr. William M. Bevis, Bartow, recently resigned as County Health Officer of Polk County.

Dr. Alfred T. Eide, Haines City, has been appointed as County Health Officer of Polk County.

Dr. John W. Shisler, Miami, has taken up his new duties as Director of Public Welfare of that city.

Dr. Daniel C. Main has returned to Florida to practice, after several years' service at St. Elizabeth's Hospital, Washington, D. C.

Deaths

Dr. James Alpheus Butler, Tampa, aged 49, died April 2 of carcinoma of the stomach.

Dr. Joseph C. Hughes, Eustis, aged 79, died September 23 as the result of an injury received in a fall.

Dr. Lois D. Matthews Innes Schroers, West Palm Beach, aged 47, died November 3 of heart disease.

Dr. Mallie C. Newton, Bonifay, aged 58, died October 27.

Dr. George Morton Prentice, Lake Worth, aged 75, died November 4.

GEORGIA

The Macon Hospital, Macon, has appointed the following physicians to the Staff: Surgery, Dr. C. H. Richardson, Jr., Dr. Harry Moses and Dr. O. H. Weaver; Medicine, Dr. I. H. Adams, Dr. F. L. Webb, and Dr. T. E. Rogers; Obstetrics, Dr. O. S. Spivey and Dr. O. R. Thompson; Urology, Dr. W. L. Bazemore and Dr. Ernest Corn; Eye, Ear, Nose and Throat, Dr. Anderson and Dr. C. L. Pennington; Dermatology, Dr. J. M. Sigman; Orthopedics, Dr. W. A. Newman; Mental Diseases, Dr. Y. H. Yarbrough.

Dr. H. S. McCoy, formerly of Doerun, had moved to Sylvester.

The State Board of Health gave out a statement in November that in three sections of Georgia there was a greater spread of malaria than at any time in the past thirty years. The area most affected was in Southwest Georgia.

The State Tuberculosis Sanatorium, Alto, in cooperation with local physicians, is holding clinics in various counties for the examination of school children. It is hoped to make these clinics a permanent feature.

The Atlanta Urologic Society elected the following officers at their last meeting: Dr. W. B. Emery,

(Continued on page 38)

The colloidal ability of KNOX SPARKLING GELATINE is valuable in infant feeding

Drs. Alexander, Bogue, Downey and others have established the colloid-chemical power of gelatine. It has been proved that gelatinated milk is more readily digested and absorbed. Many physicians and institutions have adopted it for certain specialized diets of infants. It increases the available nourishment of the milk mixture. By reducing the formation of large curds, it helps overcome regurgitation and vomiting. It is indicated where infants have colic or excessive gas formation, curdy stools, diarrhea or constipation.

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(Continued from page 36)

President; Dr. E. G. Ballenger, Vice-President; and Dr. A. F. Caldwell, Secretary.

The Randolph County Medical Society, at their meeting recently in Cuthbert, elected the following officers: Dr. W. G. Elliott, Cuthbert, President; Dr. D. L. Smith, Vice-President; and Dr. G. Y. Moore, Cuthbert, Secretary-Treasurer.

Deaths

Dr. Alfred D. Jones, Atlanta, died December 1.

Dr. Claude F. Riden, Bostwick, aged 61, died November 26.

Dr. Charles J. Montgomery, Augusta, aged 60, died January 14.

Dr. Jesse J. Crumbley, Cedartown, aged 58, died September 29.

KENTUCKY

Dr. John A. Snowden, Sr., of Winchester, was presented a beautiful silver cup by the Clark County Medical Society in recognition of his service to the medical profession in that County. Dr. Snowden had been in active practice for more than fifty years.

Dr. John Walker Moore, Louisville, has been appointed Dean of the School of Medicine of the University of Louisville, succeeding Dr. Stuart Graves, who resigned to accept a similar position at the University of Alabama, University, Alabama.

Dr. James W. Scudder, Calhoun, has taken over the duties as Health Officer of McLean County.

Dr. James S. Fitzhugh, former Health Officer of McLean County, is now practicing medicine at Central City.

Dr. William F. Peebles, Clinton, has been selected as President of the Walnut Log Medical Society.

The Baptist General Hospital, Ashland, has been purchased by Dr. John W. Stephenson and will be known hereafter as the Stephenson Hospital and Clinic.

Deaths

Dr. John D. Mott, Crider, aged 87, died December 1.

Dr. Tipton Westerfield Jones, Barbourville, aged 61, died November 16.

Dr. Samuel Montgomery Leeper, Fredonia, aged 80, died suddenly of heart disease on November 30.

Dr. Frank W. Fleischaker, Louisville, aged 51, died November 26 of heart disease.

Dr. John Duncan Trelkeld, Paducah, aged 77, died December 5.

Dr. Wallis Wyatt Durham, Lakeland, aged 47, died November 7, following an operation for gall stones.

Dr. Charles G. Pieck, Covington, aged 67, died October 31 of uremia.

LOUISIANA

The Charity Hospital, Shreveport, is being reconstructed. A new wing is being added and the Hospital is being made fireproof, the improvements and equipment costing $150,000.

Surgeon R. E. Bodet, U. S. Quarantine Station, New Orleans, has been transferred to U. S. Quarantine Station, Mobile, Ala.

Dr. Henry Daspit, New Orleans, has been appointed Dean of the Graduate School of Medicine of Tulane University, succeeding Dr. E. Denegre Martin, resigned.

Dr. Frank H. Walke, Shreveport, was elected Chairman of the Section on Railway Surgery, Southern Medical Association, at the annual meeting in Asheville, North Carolina, in November.

The Orleans Parish Medical Society elected Dr. Erasmus D. Fenner, New Orleans, as President and Dr. Henry Theodore Simon, New Orleans, was re-elected Secretary.

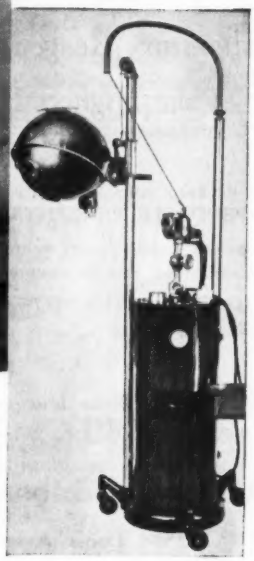
The Presbyterian Hospital, New Orleans, dedicated the first unit of the new building on October 12. The building was named in honor of Dr. James M. Batchelor.

The new Caldwell Hospital, Columbia, was dedicated recently.

Deaths

Dr. Samuel M. Scott, Oakdale, aged 55, was killed October 27 in an automobile accident.

(Continued on page 40)



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3. **And just how much of this treatment is feasible in each case?**
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The most convincing answers to the first two questions can be had by reading accounts of current work in various medical journals, reprints of which will be sent you gladly upon receipt of the coupon below. These reprints will give you a satisfactory answer to question three also.

In answering the fourth question it should be definitely borne in mind that the lamp used must create the Ultra-Violet Rays in the proper quantity and quality to produce proper therapeutic results. In fact, Ultra-Violet Rays is today an accepted modality by the profession generally for treating certain diseases only as a result of a long period of trial. During this trial the HANOVIA QUARTZ LAMPS, the ALPINE SUN and KROMAYER played an important part. Today they are considered the standard source of Ultra-Violet Rays which they produce in the proper quantity and quality so necessary to attain the looked for results.

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(Continued from page 38)

Dr. George Buckner LeSuer, Good Hope, aged 51, died October 4 of traphic cirrhosis of the liver.

Dr. William W. Lessley, Carencro, aged 80, died November 21.

Dr. Albert James Roberts, Olive Branch, aged 82, died October 28 of chronic endocarditis and nephritis.

MARYLAND

New officers for the Baltimore City Medical Society were elected at the annual meeting on December 7: President, Dr. Joseph C. Bloodgood; Vice-President, Dr. Charles Bagley, Jr.; Secretary, Dr. Edward P. Smith; Treasurer, Dr. Charles Emil Brack.

The associate members of the Baltimore City Medical Society, at their meeting on December 19, elected the following officers: Dr. Sydenham R. Clarke, President; Dr. A. M. Bacon, Vice-President; Dr. J. W. Reese, Secretary-Treasurer.

The Frederick County Medical Society, at the November meeting, elected the following officers: Dr. James A. Long, Frederick, President; Dr. Victor Cullen, State Sanatorium, First Vice-President; Dr. P. S. Lansdale, Frederick, Second Vice-President; Dr. Frank D. Worthington, Frederick, Secretary; Dr. Wm. C. Johnson, Frederick, Treasurer.

Dr. J. C. Bloodgood has for many years been interested in educating the public to the need of early diagnosis of cancer, and the physician to recognize earlier and earlier the cancerous or pre-cancerous lesions which he encounters in his practice. He has conducted a laboratory largely at his own expense to further this end. Dr. Bloodgood received Christmas a substantial money contribution to his studies. Francis P. Garvan, head of the Chemical Foundation, has given to Johns Hopkins University ten thousand dollars for additions to Dr. Bloodgood's laboratory, and ten thousand dollars per year for each of the next five years for support of the work. Studies are to be pushed by Dr. Bloodgood along the line of developing simpler and surer staining methods for rapid

(Continued on page 42)

Rapidity of bactericidal action
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MANUAL EXPRESSION

of the Breast Stimulates it to Greater Excretion

WHEN ALL EFFORTS

to supply the infant with Breast Milk fail

TRY COMPLEMENTING

those breast feedings which do not satisfy with

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B. B. CULTURE LABORATORY, INC.

Yonkers, New York.

(Continued from page 40)

operating room diagnosis of cancer. The Committee on Standardization of Biological Stains, which was organized by the National Research Council shortly after the war, will cooperate with the Hopkins research workers by supplying, through Mr. Garvan and the Chemical Foundation, the dyes and stains needed for the work.

Dr. Thomas Richmond Boggs, Baltimore, married Miss Kate Newell Doggett at Fredericksburg, Virginia, on November 13.

Dr. William H. Welch, Director Emeritus, Johns Hopkins University School of Hygiene and Public Health, was honored on November 20 at a testimonial dinner attended by about 200 of his friends.

Johns Hopkins University School of Medicine is planning a new five-story building which will cost about $350,000.

The Library at Johns Hopkins University, Baltimore, received a bequest of $8,700 from Lady Osler, who died in England last August. Lady Osler was the widow of the late Sir William Osler.

Johns Hopkins Hospital, Baltimore, for the first time, it is said, has sought a contract with the Supervisors of Baltimore City Charities, requesting $25,528 for the maintenance of forty-five free beds for the care of city patients.

The Book and Journal Club, Baltimore, was recently rechristened the Osler Club, honoring Sir William Osler.

Dr. Joseph P. Franklin, of the Baltimore City Health Department, has resigned to accept an appointment as Health Officer of Allegany County.

Dr. Lyman S. Abbott, of the Baltimore City Health Department, has resigned and accepted a position in St. Louis.

Dr. George H. Preston, Baltimore, has resigned as Executive Secretary of the Mental Hygiene Society of Maryland to devote his time to the office of State Commissioner of Mental Hygiene.

Dr. Ralph Truitt, Baltimore, has been appointed Executive Secretary of the Mental Hygiene Society of Maryland.

(Continued on page 44)

OXYGEN THERAPY

THE McKesson Apparatus No. 330 is constructed for the administration of high concentrations of oxygen in asthma, pneumonia, acute arthritis and other conditions in which oxygen is recognized as the best treatment.

It is also equipped for treatment of patients who have been overcome with automobile fumes, illuminating gas and other vapors.

The little outfit embodies the Automatic Valve controlled by the breathing of the patient, so that the treatment may be carried out by the patient in the home or by the attendants in the hospital.

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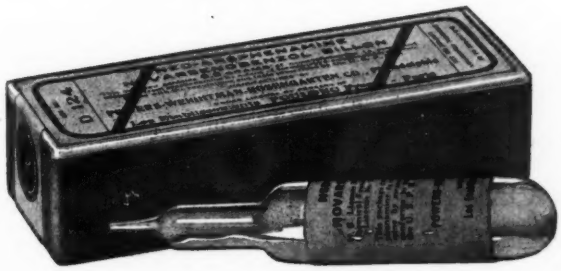

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MANHATTAN EYE SALVE COMPANY

Louisville, Kentucky

(Continued from page 42)

A bill has been introduced in the United States Senate which would authorize Dr. William S. Thayer and Dr. William H. Welch, both of Baltimore, "to accept such decorations, orders and medals as have been tendered them by foreign governments." These physicians are members of the Medical Reserve Corps of the Army and congressional authority is necessary before they can accept foreign decorations.

Dr. Frank B. Hines, Chestertown, has been appointed Health Officer of Kent County.

The Johns Hopkins University School of Medicine, Baltimore, held dedicatory exercises on December 5 for the new Dispensary and Outpatient Department. More than 1,200 persons daily can be given treatment, most of which will be free for the poor. The Carnegie Corporation in 1923 gave the University $2,000,000 for the erection and maintenance of the Dispensary, which is a memorial to the friendship between Andrew Carnegie and Dr. Daniel Court Kilman, first President of Johns Hopkins University. The building cost $1,100,000 and the remainder of the fund has been set aside for endowment and maintenance.

Deaths

Dr. George Ransom Faircloth, Baltimore, died recently.

Dr. Jeptha Ellsworth Pitsnogle, Hagerstown, aged 65, died in September.

MISSISSIPPI

Dr. Robin Harris, formerly of Memphis, has moved to Jackson.

Dr. W. J. C. Wiemers, Columbus, has been appointed to the Medical Staff of the Sanatorium at Magee.

Dr. Wallace Polk Sheely, Gulfport, was married to Miss Regina Hairston Flournoy, of Columbus, on November 8.

The Clarksdale and Six Counties Medical Society held its fifty-third semi-annual meeting at Clarksdale November 7.

(Continued on page 46)

INFLUENZA

The experience of physicians who have used Mulford Influenza Serobacterin Mixed, in industrial institutions and private practice, has confirmed their belief in its efficiency, both as a prophylactic and therapeutic agent.

The structural formula of Mulford Influenza Serobacterin Mixed has been maintained unchanged since its introduction, in 1910, but in the meantime, particularly during the influenza epidemic of 1918, new strains of bacteria have been added, thus increasing its polyvalency and efficiency. These bacteria include:

Influenza Bacillus (Pfeiffer)	Pneumococcus (types I, II, III, IV)
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Staphylococcus (aureus and albus)	Bacillus Friedlander

As immunity is only relative, there is an advantage in four or more injections, beginning with a small initial dose, progressively increased, thus affording a more complete and lasting immunity.

Influenza Serobacterin Mixed is supplied as follows:

M 109-0— 4-syringe ..... 1 immunization
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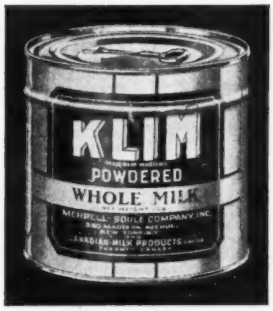

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KLIM Powdered Whole Milk possesses all the favorable attributes of boiled milk for infant feeding yet has none of its objectionable characteristics.

It is safe, due to the absence of pathogens; yet not sterile. Its curd is soft and friable. Furthermore at no stage in its making has it been subjected to temperatures higher than that of pasteurization (145 degrees F.).

Klim, therefore, is as safe and as digestible as boiled milk and, as it has not been oxidized, is the biological equal of raw milk.

It is more convenient for the mother to use, is more uniform, and may be taken on trips or fed under any circumstances or conditions.

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In addition to
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Merrell-Soule offers:

POWDERED PROTEIN MILK

This is the dehydrated equivalent of Finkelstein's original Eiweissmilch. Sustained pediatric recognition and approval testify to the fact that Merrell-Soule Powdered Protein Milk has a definite place in infant feeding.

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This is correct in composition and acidity, preserving all the qualities of a hospital formula. It is easily prepared in the home and is a demonstrated clinical success.

(Recognizing the importance of scientific control, all contact with the laity is predicated on the policy that KLIM and its allied products be used in infant feeding only according to a physician's formula.)

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WHOLE MILK

Merrell-Soule Powdered Milk Products are packed to keep indefinitely. Therefore, trade packages need no expiration date.

Constipation

IN THE BREAST-FED INFANT

Horlick's Malted Milk has long been used with success in the prevention and correction of constipation among breast-fed infants.

For the Nursing Mother:

Many doctors advise the nursing mother to drink regularly each day three glasses of Horlick's—the Original—Malted Milk, knowing that she will add to her own store of energy, increase the flow of her breast milk and provide her child with the food elements which result in regular bowel movements daily.

For the Breast-fed Baby:

Supplementary feedings of "Horlick's" almost invariably bring relief to the child and rest to the mother, even in stubborn cases of constipation.

Clip out this coupon and return for a supply of samples:

Name.....M. D.

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Horlick **Racine, Wisconsin**

(Continued from page 44)

Dr. C. J. Lewis, Assistant Superintendent of the South Mississippi Charity Hospital, Laurel, has resigned and will enter private practice in Meridian.

Dr. Thomas R. Beech, Ellisville, has been appointed Assistant Superintendent of the South Mississippi Charity Hospital, Laurel.

The Board of Aldermen of Aberdeen has recently appointed a committee to select a site for a community hospital to cost $50,000. A bill has been introduced in the Mississippi Legislature by which the State will assist the Town and County in providing the charity wards in the new hospital.

The Holmes County Community Hospital, Lexington, announces a campaign to raise $50,000 for the erection of a modern hospital building.

Dr. H. C. Hicks, formerly of the Oklahoma State Department of Health, has assumed his new duties as Director of the Bureau of Communicable Diseases of the Mississippi State Board of Health.

Dr. M. C. Balfour, of the Training Station at Indianola, has been transferred to New York, and was relieved by Dr. J. H. Janney.

Deaths

Dr. William Hunt Burress, Baldwyn, aged 53, died October 24.

MISSOURI

The Scott County Medical Society met in Benton and elected the following officers: President, Dr. H. M. Kendig, Sikeston (re-elected); Secretary, Dr. U. P. Haw, Benton; Board of Censors, Dr. G. U. H. Presnell, Sikeston, Dr. G. T. Dorris, Illmo, and Dr. L. O. Rhodes, Sikeston.

Dr. Cleveland H. Shutt has been elected President of the St. Louis Medical Society.

Dr. W. J. Parker, Steelville, celebrated his fiftieth year in practice on September 30.

Dr. Frank Johnson Hall and Dr. Robert Koritschoner have become associated in the direction of the Laboratory of Clinical Pathology, Kansas City.

(Continued on page 48)

in Influenza

CLINICAL experience during influenza epidemics demonstrated the value of Calcreose in this disease and its pulmonary and intestinal complications.

Persistent coughs and bronchitis are particularly amenable to Calcreose.

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Tablets Calcreose 4 grs.
Each Tablet Calcreose 4 grains contains 2 grains pure creosote combined with hydrated calcium oxide. The full expectorant action of creosote is provided in a form which patients will tolerate.

COMPOUND SYRUP OF CALCREOSE
Also available . . . Compound Syrup of Calcreose, Maltbie, for the lesser ailments of the respiratory tract . . . a tasty, effective cough syrup that does not nauseate . . . each fluid ounce representing Calcreose Solution, 160 minims (equivalent to 10 minims of pure creosote); Alcohol, 24 minims; Chloroform, approximately 3 minims; Wild Cherry Bark, 20 grains; Peppermint, Aromatica and Syrup q. s

Liberal samples of tablets & syrup to physicians on request

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THE HOFFMANN-LA ROCHE CHEMICAL WORKS NEW YORK
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Adults
2 teaspoonfuls every 2 hours, or larger doses if necessary.
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Marketed in 6 oz. bottles
COUNCIL ACCEPTED
Never advertised to the laity
A bottle for home use sent to physicians only on request
An effective medicament for respiratory affections which contains only one drug—Thiocol. . . . No sedatives! No narcotics! Thiocol exerts an anti-catarrhal effect upon the entire respiratory tract and, in that manner, definitely aids in subduing the cough.
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F. Hoffmann-La Roche Chemical Works, New York
Makers of Medicines of Pure Quality
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NEW YORK CITY
COUGHS
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931 No. Ala. St. Indianapolis

(Continued from page 46)

Dr. E. H. Kessler, St. Louis, has reopened his office and will again practice roentgenology after having retired from active practice on account of his health.

Dr. George Clark Mosher, Kansas City, has been elected a life member of the Toledo Academy of Medicine, the Cincinnati Obstetrical Society and the Louisville Obstetrical Society.

The Southwest Missouri Medical Society held its fifty-fourth annual meeting at Springfield on November 2 and elected the following officers: President, Dr. Wilbur Smith, Springfield; First Vice-President, Dr. Arthur D. Knabb, Springfield; Second Vice-President, Dr. J. C. B. Davis, Willow Springs; Recording Secretary, Dr. W. R. Beatie, Springfield (re-elected); Treasurer, Dr. Lee Cox, Springfield; Corresponding Secretary, Dr. Joseph W. Love, Springfield.

Deaths

Dr. William L. M. Witter, Milan, aged 76, died November 27.

Dr. James Israel Tyree, Joplin, aged 38, died October 25, following an appendectomy.

Dr. George Lee McCutchan, Canton, aged 52, died September 29 of bronchopneumonia.

Dr. Samuel Martin Malone, St. Louis, aged 50, died October 22 of heart disease.

Dr. James A. Larrabee, Barnard, aged 72, died November 7 of pneumonia.

Dr. Joseph M. Davis, Thomasville, aged 65, died November 6 of heart disease.

Dr. George B. Homan, St. Louis, aged 84, died November 15 of bronchopneumonia.

Dr. William J. Ham, Creve Coeur, aged 61, died November 6 of nephritis.

Dr. Enoch H. Miller, Liberty, aged 77, died October 7.

NORTH CAROLINA

The Fifth District Medical Society held its semi-annual meeting recently and elected Dr. A. H. Mc-

(Continued on page 50)

Laboratories of

Drs. Bunce, Landham and Klugh

ATLANTA, GEORGIA

George F. Klugh, M.D., Director, Laboratory of Clinical Pathology
Jackson W. Landham, M.D., Director, Laboratory of Radiology (X-Ray and Radium)

These laboratories are equipped for making every test of clinical value in the diagnostic study of medical and surgical cases. Only standardized methods and technique are used.

In addition to the diagnostic study of cases there are adequate facilities for the x-ray and radium treatment of conditions in which these forms of treatment are indicated.

Containers for pathological specimens and information in reference to x-ray and radium work furnished upon request.

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AN unrivalled record of results over a period of many years, has definitely established the fact that Dryco is ideal for infants deprived of breast milk and is of especial value in difficult feeding cases. It is significant that this milk has long maintained steadily increasing prestige with the medical profession and is prescribed by leading pediatrists all over the world.

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EXPERIENCED x-ray and laboratory technician desires a position with a doctor's clinic, hospital or public health laboratory. Best of references. Address H. P., care Southern Medical Journal.

DRUG AND ALCOHOLIC PATIENTS are humanely and successfully treated in Glenwood Park Sanitarium, Greensboro, N. C.; reprints of articles mailed upon request. Address W. C. Ashworth, M.D., Owner, Greensboro, N. C.

TO THE MEDICAL PROFESSION: We are filling a long-felt want by conducting a training class teaching blood counts, urinalyses, sputum and feces examinations; also basal metabolism readings. We will gladly furnish you with competent office assistants trained in such laboratory procedures as you may require. Our classes are made up of stenographers, bookkeepers, registered nurses and clerks. Send us your office assistant for training. Write or telephone for full information. Dial 3-3598. John V. Mix, Director, Alabama Pathological Laboratory, 1005 Martin Building, Birmingham, Alabama.

COMPLETE set of instruments for eye, ear, nose and throat specialist. A six-drawer Treatment Table, Springfield three-piece Gas Sterilizer, Treatment Chair, Instrument Cabinet, Perimeter, Trial Case, Ophthalmometer on adjustable table, Suction and Pressure Apparatus. Will sacrifice. Address Mrs. Inez B. Martin, 721 East 41st Street, Savannah, Georgia.

HOSPITAL EQUIPMENT FOR SALE—Meriwether Hospital and Training School of Asheville, North Carolina, has closed. We have on hand one set of electric sterilizers, complete, American make, in perfect condition. Autoclave, instrument, utensil, hot and cold water, was used for fifty-bed hospital, but will do for smaller or larger. A great bargain. Also one electric elevator in good condition, cheap. Address Meriwether Hospital, 37 Watauga Street, Asheville, N. C.

CENTRIFUGES

INTERNATIONAL EQUIPMENT COMPANY
352 Western Ave., Boston, Mass.

(Continued from page 48)

Cleod, Aberdeen, President; Dr. O. L. McFayden, Fayetteville, re-elected Secretary-Treasurer.

Wake County Medical Society met recently and elected the following officers: Dr. Robert P. Noble, Raleigh, President; Dr. C. C. Carpenter, Wake Forest, Vice-President; and Dr. R. B. Wilkins, Raleigh, Secretary-Treasurer.

Alamance-Caswell County Medical Society held its meeting on December 15, at which time the following officers were elected: Dr. S. A. Malloy, Yanceyville, President; Dr. J. C. Wilkins, Haw River, Vice-President; and Dr. B. B. McDade, Burlington, Secretary-Treasurer.

The Guilford County Medical Society, at its recent annual meeting, elected Dr. J. L. Spruill, Jamestown, President; Dr. C. E. Reitzel, High Point, Vice-President; and Dr. Marian Y. Keith, Greensboro, Secretary-Treasurer.

The Seaboard Medical Association held its thirty-third annual meeting at Washington December 4, 5 and 6. Dr. R. A. Davis, Newport News, was chosen President; Dr. S. M. Mann, Moyock, First Vice-President; Dr. James A. Grizzard, Drewryville, Second Vice-President; Dr. W. I. Wooten, Greenville, Third Vice-President; Dr. Robert Mathews, Norfolk, Fourth Vice-President; Dr. A. M. Burfoot, Fentress, re-elected Treasurer; and Dr. Clarence Porter Jones, Newport News, re-elected Secretary.

The Fourth District Medical Society held its meeting at Roanoke Rapids on November 20 and the following officers were elected: Dr. T. W. M. Long, Roanoke Rapids, President; Dr. L. W. Kornegay, Rocky Mount, Vice-President; Dr. W. Bernard Kinlaw, Rocky Mount, re-elected Secretary-Treasurer.

The Laboratories of the Bulluck Hospital, Wilmington, were recently given the highest rating of the Council on Medical Education and Hospitals of the American Medical Association. Only 150 laboratories in the United States have this rating.

The Kinston Clinic, operating the Memorial General Hospital, Kinston, has organized an Endoscopic Clinic with Dr. Vance P. Peery in charge. This Clinic is for the diagnosis and treatment of diseases of the air and food passages and removal of foreign bodies.

The Ellen Fitzgerald Hospital, Monroe, has opened its School for Nurses.

The Gaston County Medical Association, at its meeting on December 11, chose Dr. C. H. Pugh, Gastonia, President; Dr. C. E. Lyday, Gastonia, Vice-President; Dr. J. W. Campbell, Gastonia, Second Vice-President; Dr. J. A. Anderson, Gastonia, Secretary-Treasurer.

The Cabarrus County Medical Society recently elected Dr. J. A. Patterson, Concord, President; Dr. I. A. Yow, Concord, Vice-President; Dr. J. A. Hartsell, Concord, Secretary-Treasurer.

Dr. J. P. Nicholson, Hamptonville, who was a Surgeon of the Confederate Army, and the oldest family doctor in North Carolina, celebrated his ninety-third birthday on December 16. He has practiced medicine in his section of the State for 64 years continuously.

Dr. Herbert C. Neblett has established offices in

(Continued on page 52)

GONOSAN
"RIEDEL"

The Distinctive Properties of Gonosan

Inhibits gonococcal development and minimizes its virulence.
Aids in reducing the purulent secretion.
Encourages normal renal activity.
Relieves the pain and strangury and allays the irritation and inflammation.
Does not irritate the renal structure or the digestive organs.
Prescribe GONOSAN for acute and chronic cases.

Samples are at your disposal.

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Berry and So. 5th Streets Brooklyn, N. Y.

Patient Types . . .

The Hospital Case

CONFINED to the bed, weak and nervous, the hospital patient under your care is hardly a fit subject for the old-fashioned drastic purge.

Petrolagar has many advantages in maintaining bowel function. It is palatable. It mixes easily with bowel content, supplying unabsorbable moisture with less tendency to leakage. It does not interfere with digestion and is prescribed in preference to plain mineral oil.

Petrolagar restores normal peristalsis without causing irritation, producing a soft-formed consistency that provides real comfort to bowel movement.

Petrolagar is composed of 65% (by volume) mineral oil with the indigestible emulsifying agent agar-agar.

Petrolagar

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Chicago, Ill. S.O.2

Gentlemen: — Send me copy of "HABIT TIME" (of bowel movement) and specimens of Petrolagar.

Dr.....

Address.....

.....

(Continued from page 50)

Charlotte and will limit his practice to Ophthalmology. Dr. Neblett has just recently resigned from the Medical Corps of the Army.

Dr. Paul P. McCain, Sanatorium, has been elected President of the Southern Sanatorium Association. Dr. McCain is Medical Director and Superintendent of the North Carolina Tuberculosis Sanatorium.

Dr. T. H. Houck is now associated with Dr. C. H. C. Mills, Charlotte, and will limit his practice to obstetrics.

Dr. Fred M. Hanes, Winston-Salem, has been appointed a member of the Board of Directors of the North Carolina Tuberculosis Sanatorium.

Dr. W. H. Scruggs, Jr., of Gastonia, was married to Miss Elizabeth Brown, of Newton, November 28.

Dr. Carey Winston Durham, of Sanford, was married to Miss Alberta Emily Rodgers, of Washington, D. C., November 29.

Dr. James Edward Shuler, Durham, was married to Miss Lucie Spearman Bronson, of Greensboro, December 8.

Dr. Saunders Robert Jordan, Pleasant Garden, was married to Mrs. Annie Belle Fields, of Greensboro, recently.

Dr. Robert Lee Felts, Durham, was married to Miss Jessie Alexander Giles, Asheville, November 15.

Deaths

Dr. James R. Anderson, Morganton, aged 67, died December 13.

Dr. Joseph Peyton Fearington, Winston-Salem, aged 66, died November 23 of pneumonia.

Dr. James E. Malone, Louisburg, died November 29.

Dr. F. J. Garrett, Rockingham, aged 64, died December 23.

Dr. A. T. Millis, Guilford College, aged 80, died December 16.

OKLAHOMA

The Southern Oklahoma Medical Association was organized in Duncan December 20. Dr. A. J. Weedn, Duncan, was elected President; Dr. J. W. Nieweg, Duncan, Secretary-Treasurer. The following were elected Vice-Presidents: Dr. A. B. Leeds, Grady County; Dr. E. W. Hawkins, Cadda County; Dr. E. B. Dunlap, Comanche County; Dr. W. M. Browning, Jefferson County; Dr. D. Long, Stephens County; Dr. W. H. Williamson, Murry County. Others will be elected later.

Dr. Louis A. Turley is now head of the Department of Pathology of the School of Medicine, University of Oklahoma, Oklahoma City.

Osage County Medical Society elected Dr. J. G. Shoun, Fairfax, President; Dr. C. H. Guild, Apperson, Vice-President; and Dr. M. E. Rust, Pawhuska, Secretary-Treasurer.

Oklahoma City Academy of Medicine elected Dr. L. M. Westfall, President; Dr. T. G. Walls, Secretary; and Dr. L. J. Starry as member of the Executive Board.

Dr. Frank McGregor, Mangum, was chosen President of the Oklahoma Hospital Association at the annual meeting in Oklahoma City recently.

Tulsa County Medical Society elected the following officers for 1929: Dr. C. T. Hendershot, Tulsa, President; Dr. J. F. Gorrell, Tulsa, President-Elect; Dr. Henry S. Browne, Tulsa, Vice-President; Dr. Edna May Sippel, Tulsa, Secretary-Treasurer.

Oklahoma Society for Crippled Children reports 3,735 patients were examined during the year 1928 and 1,628 were hospitalized.

Deaths

Dr. A. W. Coleman, Davenport, aged 72, died suddenly November 16.

Dr. Walter Phillips Robinson, Sapulpa, died December 2.

Dr. Z. G. Taylor, Mounds, aged 77, died December 2.

SOUTH CAROLINA

The American Red Cross has distributed 90,000 five-grain capsules of quinin in Southeastern South Carolina to combat an outbreak of malaria.

The annual meeting of the State Medical Association will be May 7, 8 and 9 at Charleston. The Francis Marion Hotel will be headquarters.

(Continued on page 54)

IN THE TREATMENT OF

CYSTITIS and URETHRITIS

OLEO-GOMENOL

has therapeutic properties to an exceptional degree

A most powerful germicide. *An effective deodorant.* *A dependable analgetic.*

Unlike the Eucalyptols it is free of any trace of aldehydes.

For more than twenty-five years Oleo-Gomenol has been continuously and effectively used in the clinics of Europe, and in the offices of several hundred American urological specialists.

Packed in containers of 48 cc., 100 cc., 250 cc., and 1000 cc.

"GOMENOL—(Gomen, *a locality in New Caledonia,* + L. oleum, *oil.*) *An ethereal oil obtained from a plant,* Melaleuca viridiflora; *it is said to have powerful germicidal action and to be free from irritating properties when locally applied."*—STEDMAN'S MEDICAL DICTIONARY.

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The Remarkable Story *of* A Can of Milk

SEVENTY years ago, Gail Borden offered to the medical profession of his day a can of milk. "This, gentlemen", we can imagine his saying, when representatives from the New York Academy of Medicine officially inspected his laboratory in 1857, "this, gentlemen, is condensed milk. Fresh, pure, full-cream milk, from which most of the water has been removed and to which refined cane sugar has been added. I offer it to you, gentlemen, as a practical aid in one of your most vexing problems — the problem of securing a safe milk supply under all conditions of climate and travel."

Gail Borden's can of milk was destined to revolutionize the milk industry of the world. And it was destined to play a part in the evolution of a science then in its infancy—the science of infant feeding.

For Gail Borden's milk "agreed" with babies. This was obvious from the very first—though it remained for the research workers of a later generation to fully explain why. Gail Borden had "builded better than he knew"! The cane sugar content of his milk—added in proportions that would assure "keeping"—was found also to assure the average infant a satisfactory supply of carbohydrates. And the method by which the milk was condensed —prolonged cooking in vacuo—not only destroyed harmful bacteria but overcame effectually the difficulty of casein digestion which had caused such great trouble among artificially fed babies. Changes in milk structure produced by this method made condensed milk as easy to digest as breast milk.

This marvelous assimilability led, naturally, to wide use of the food. It would be impossible to estimate how many millions of babies, generation after generation, have been fed on Eagle Brand Condensed Milk. *And it would be just as impossible to estimate how many controversies have raged over this pioneer food, as research and experimentation have piled up new facts, new theories and new methods in the science of infant feeding!*

Yet Eagle Brand continues to be used successfully today, indisputably a factor in modern infant feeding. Laboratory experiment has confirmed the vast empirical proof of its specific applicability to certain cases and its therapeutic value under certain conditions. Today's pediatrician, armed with the newer knowledge of nutrition, can still take Gail Borden's can of milk and—recognizing its limitations, supplementing its deficiencies, readjusting, when necessary, its percentages — use it as an effective weapon in the fight to suitably feed the infant deprived of natural food.

Eagle Brand *Condensed* Milk

(Continued from page 52)

TENNESSEE

The Robertson County Medical Society, at its last meeting, elected Dr. J. S. Freeman, Springfield, President; Dr. B. B. Sory, Cedar Hill, Vice-President; Dr. W. F. Fyke, Springfield, Secretary-Treasurer.

Dr. Charles W. Price, Nashville, has opened offices in the Bennie-Dillon Building and will limit his practice to dermatology.

Anderson County Medical Society has unanimously approved changing the present part-time County health unit to a full-time basis, and indications are that the Court will make the change at its quarterly session.

Knoxville is to have a new Medical Arts Building, the contract having already been let. The physicians of Knoxville are erecting this building at a cost of half a million dollars.

Maryville physicians are planning a series of health talks to high school pupils over a period of five or six months on such subjects as tobacco, care of the teeth, ventilation, sanitation, hygiene, etc.

The Benton, Carroll, Henry, Weakley Medical Society has elected Dr. W. W. McBride, Gleason, President; Dr. Geo. McSwain, Paris, First Vice-President; and a vice-president for each county. Dr. R. M. Little, Martin, was re-elected Secretary-Treasurer.

Dr. James O. Gordon, Memphis, and Miss Ruby Thomas, of Tupelo, Miss., were married September 30.

Dr. Walter Agnew Thomison, Dayton, was married to Miss Shirley Caskins, of Hazelhurst, Ga., December 4.

Deaths

Dr. John H. Connell, Covington, aged 45, died October 26 of interstitial nephritis.

Dr. William Asbury McClain, Sweetwater, aged 60, died November 13 of cerebral hemorrhage.

Dr. John P. Sims, Friendship, aged 68, died in November.

Dr. Elijah B. Walker, Savannah, aged 68, died suddenly while seated in his automobile in front of his office November 28.

Dr. Thomas J. Ford, Baxter, aged 53, died November 13 of heart disease.

TEXAS

Dr. Thomas P. Haslam, formerly of Elkins, West Va., has been appointed Associate Professor of Pathology at Baylor University College of Medicine, Dallas, and Medical Director of the Baylor Hospital Clinic.

The Second District Medical Society met October 15-16 at Sweetwater and officers elected were: Dr. A. H. Fortner, Sweetwater, President; Dr. T. Wade Hedrick, Abilene, Vice-President; Dr. M. H. Bennett, Big Spring, Secretary-Treasurer. The meeting in 1929 will be held at Big Spring.

Dr. Valentine Lawrence Puig, Jr., Laredo, was married to Miss Sarah Louise Payne, of Esmont, Virginia, on October 6.

The Shaw Clinic and Hospital at Marlin will build a new wing to the building. It will be one story and of brick construction and is so planned when another wing is added an open court will be provided in the center.

Dallas Medical and Surgical Clinic Building is to have an addition in the near future and will cost approximately $100,000. It is expected to have the building completed by March 1st.

Wichita Falls Clinic-Hospital will build a 30-bed addition to their building, and it is estimated that it will cost, when equipped, from $80,000 to $85,000.

The citizens of Quanah held a mass meeting recently and were unanimous in their decision to take whatever steps were necessary for securing a county hospital for Hardeman County. They contemplate a bond issue of $200,000 and, if it is carried, to build a 75-bed hospital with all modern conveniences.

Deaths

Dr. Egbert A. Watters, Fort Worth, aged 68, died October 11 of bronchopneumonia.

Dr. Murray Lee Chapman, Temple, aged 58, died November 9 of cerebral hemorrhage.

(Continued on page 56)

To Replace Lost Alkalies

In states of alkali depletion with their attendant symptoms, a convenient and rational method of alkalization is afforded in the prescription of **Kalak Water.**

Kalak Water contains a mixture of the elements normally present for maintaining the alkali reserve. Besides 1.0326 grams of Disodium phosphate, Sodium chloride and Potassium chloride, each liter carries a total of 6.6648 grams of the bicarbonates of Calcium, Magnesium, Sodium and Potassium.

1 liter of Kalak Water requires 710 cc. of a standard tenth-normal hydrochloric acid solution for neutralization of the bases present as bicarbonates or carbonates.

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Dosage Table
Indications | Adults | Children | Frequency —Remarks
Epilepsy | 1½ to 3 gr. per day | ¼—1 gr. per day | In one dose at night or divided.
Migraine | ¾—1 gr. | . . . . | 2 or 3 times daily.
Vomiting of Pregnancy | ½—1½ gr. | . . . . | Subcutaneously Luminal - Sodium every 4 to 6 hours.
Eclampsia | 3—6 gr. | . . . . | Preferably subcutaneously (Luminal-Sodium).
Insomnia | 1½—5 gr. | . . . . | Larger doses require caution.
Drug Addiction | 1½—3 gr. | . . . . | 2, 3 or 4 times daily.
Tetanus | 3—5 gr. | . . . . | Every 3 to 6 hours.
Chorea | . . . . | ¼—½ gr. | 2 or 3 times daily.
Cardiac Neuroses | ¼—½ gr. | . . . . | 2 or 3 times daily
Dysmenorrhea | ¼—½ gr. | . . . . | 2 or 3 times daily
Gastric Neuroses | ¼—½ gr. | 1-16—½ gr. | 2 or 3 times daily.
Surgical Cases | ¼—½ gr. | . . . . | 2 or 3 times daily.
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How Supplied
Luminal: ¼, ½ and 1½ gr. tablets. Elixir of Luminal (¼ gr. to teaspoonful).
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(Continued from page 54)

Dr. Wm. K. McCardell, Livingston, aged 70, died June 8.

Dr. Nora A. Donahoe, Dallas, aged 56, died November 8 of osteomyelitis.

Dr. J. H. Stevens, Temple, aged 92, died July 5 of heart disease.

Dr. Kinya Tsukahara, Dallas, aged 55, died November 22 of pneumonia.

Dr. Walter William Callan, Rotan, aged 59, died in November.

Dr. Samuel W. Lytall, Quinlan, aged 54, died November 12 of nephritis and cerebral hemorrhage.

Dr. John G. Poindexter, Corpus Christi, aged 78, died November 8.

Dr. William E. Lucey, Cleburne, aged 42, died November 11 of cerebral hemorrhage.

Dr. William H. Evans, Maud, died October 17.

Dr. J. H. Reagan, Beaumont, aged 58, died October 3.

VIRGINIA

Cabaniss Hall, the new dormitory for women of the School of Nursing at the Medical College of Virginia, will be formally opened on Founder's Day, February 15. This building accommodates 134 persons and has all modern conveniences.

Dr. William F. Drewry recently resigned as City Manager of Petersburg. It is said that he expects to re-enter actively the psychiatric field of medical practice. He was for a quarter of a century Superintendent of the Central State Hospital, Petersburg.

Virginia recently started a traveling Mental-Hygiene Clinic to serve the schools and medical and social agencies throughout the State and to examine and treat delinquent children. Its staff includes a psychiatrist, psychologist and two psychiatric social workers. The Commonwealth Fund has contributed approximately $40,000 for this Clinic.

Dr. Leo E. Sutton, for the past two years Assistant Pediatrician of the Harvard Medical School, Boston, has returned to Richmond and is connected with the Pediatric Department of the Medical College of Virginia.

Dr. Herbert S. Beckler, Staunton, and Mrs. Jessie M. Holt, Washington, D. C., were married November 15.

Dr. John Cecil White, Richmond, and Miss Lucile Bass, Washington, D. C., were married recently.

Dr. S. B. Perry, Hopewell, resigned as Coroner that he might be reinstated to his place as a member of the City Council of Hopewell.

Dr. James M. Rogers is visiting his former home at Amelia. He is Physician-in-Charge of the Alexander Hospital at Soonchun, Korea, the Southern Presbyterian Mission in Chosen. In spite of being so far away, Dr. Rogers maintains his membership in the Medical Society of Virginia.

Dr. J. Frank Polk is now located at Warrenton, where he is associated with Dr. John L. Thornton in general practice.

Dr. Beverley F. Echles resigned as one of the general surgeons on the staff of the McGuire Clinic, Richmond, to accept the position as Chief of the Surgical Department of the Galax Hospital, Galax.

Dr. O. C. Page, formerly of Brodnax, is now located at Hopewell.

Dr. Victor C. Vaughan, former Dean of the Medical School of the University of Michigan, will make Richmond his permanent home.

The State Board of Health is establishing a Branch Laboratory in connection with the new Northampton Accomac Memorial Hospital, Nassawadox. The Hospital is maintained by citizens of the two counties on the eastern shore of Virginia, and the staff is furnished by the Johnston-Willis Hospital, Richmond.

Dr. L. H. Apperson, Richmond, has been appointed Surgeon for the Southern Railway.

Dr. Andrew D. Hart has located in Charlottesville and will do general practice.

Dr. R. S. Faris, Richmond, has been elected President of the Southern Homeopathic Association.

Dr. William I. Prichard, Petersburg, is now able to resume his practice after recuperating from an automobile and train collision.

Dr. Philip Jacobson, Petersburg, was elected Secretary of the Post-Graduate Medical Society of Southern Virginia to succeed the late Dr. William C. Powell.

The Petersburg Medical Faculty, at the meeting of

(Continued on page 58)

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NEW ORLEANS, LA.

(Continued from page 56)

November 20, elected Dr. E. W. Young, President; Dr. W. B. McIlwaine, Vice-President; Dr. John Harwood, Secretary-Treasurer; and Dr. Ruth Mason, Corresponding Secretary.

Dr. Randolph McCutcheon, formerly of West Virginia, has located in Petersburg.

Dr. Sydney J. Baker has been elected Coroner of South Richmond, succeeding Dr. R. W. Paul, resigned.

Deaths

Dr. John M. Carrington, Clover, aged 68, died November 7.

WEST VIRGINIA

The Fayette County Medical Society elected its officers at the meeting of December 11. Dr. M. C. Borman, Montgomery, was chosen President; Dr. G. G. Hodges, Kilsythe, First Vice-President; Dr. W. E. Bundy, Minden, Second Vice-President; Dr. L. G. Houser, Beckley, Third Vice-President; and Dr. H. A. Walkup, Mt. Hope, Secretary.

The McDowell County Medical Society, at its meeting on December 12, elected Dr. D. D. Hatfield, Yukon, President; Dr. W. C. Hall, Welch, Vice-President; Dr. A. G. Rutherford, Welch, Secretary; and Dr. H. G. Camper, Welch, Treasurer.

The West Virginia Public Health Association recently met at Morgantown and at that time unanimously endorsed a medical course at West Virginia University that will meet the requirements of a Class A medical school and a training school for public health workers. The Association elected the following as its officers for the coming year: Dr. W. H. McLain, Wheeling, President; Dr. John Thames, Charleston, First Vice-President; Dr. Arthur D. Knott, Parkersburg, Second Vice-President; and Dr. D. Littlejohn, Charleston, Secretary-Treasurer.

The McDowell County Medical Society has created a building fund to be presented to the State Association when the latter organization is ready to purchase or erect a permanent home in Charleston.

The Lewis County Medical Society has chosen the following officers to serve during 1929: Dr. George Snyder, Weston, President; Dr. D. P. Kessler, Weston, Vice-President; and Dr. A. F. Lawson, Weston, Secretary-Treasurer.

Dr. O. H. Jennings, Williamson, has resigned as County Health Officer of Mingo County.

The Southern Surgical Association held its forty-first annual convention at White Sulphur Springs in December. Dr. Lucius E. Burch, Nashville, Tennessee, was elected President; Dr. Albert A. Singleton, Galveston, Texas, and Dr. Fred Bailey, St. Louis, Missouri, Vice-Presidents. The Association will meet next year in Savannah, Ga.

The Monongalia County Medical Society met at Morgantown on December 4 and named the following officers: Dr. T. Judd McBee, Morgantown, President; Dr. George W. Phillips, Morgantown, Vice-President; Dr. G. R. Maxwell, Morgantown, re-elected Secretary; and Dr. Eldon B. Tucker, Morgantown, Treasurer.

Dr. Charles E. Hutchinson, Moundsville, has been appointed Health Commissioner of that City.

The West Virginia Hospital Association convened in Charleston on December 3 for its third annual meeting. New officers for the year were elected: Dr. R. A. Ireland, Charleston, President; Dr. B. I. Golden, Elkins, First Vice-President; Dr. Walter E. Vest, Huntington, Second Vice-President; and Mr. Joe W. Savage, Charleston, Secretary-Treasurer. Mr. J. Stanley Turk, of the Ohio Valley General Hospital, Wheeling, was named as President-Elect and will take office at the expiration of Dr. Ireland's term.

Kanawah Medical Society held its annual banquet-meeting on December 18 at Charleston and named its new officers as follows: Dr. R. H. Walker, President; Dr. E. Bennette Henson, First Vice-President; Dr. J. G. Preston, Second Vice-President; and Dr. Russell Kessell, Secretary-Treasurer, all of Charleston.

Dr. Thomas W. Nale, formerly of Pittsburg, has located in Charleston and is assisting Dr. W. W. Point in the practice of obstetrics.

The Raleigh County Medical Society, at its meeting on December 13, selected Dr. Walter D. Simmons, Slab Fork, as President; Dr. B. W. Eakin, Tams, First Vice-President; Dr. A. U. Tieche, Beckley, Sec-

(Continued on page 60)

RESTORING THE NORMAL FLORA

NATURE protects the body against intestinal putrefaction by encouraging the growth of fermentative or acid-forming bacteria.

Where, through dietetic errors and neglect of the bowel, conditions are made unfavorable for the growth of the acid-forming organisms, putrefactive bacteria become dominant in the colon, leading to autointoxication and constipation.

The best method of assisting Nature to combat putrefaction is to provide the right sort of food in the colon for restoring the normal acid-forming germs, namely B. acidophilus.

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CHICAGO

(Continued from page 58)

ond Vice-President; and Dr. Ira M. Fisher, Stotesbury, Secretary-Treasurer.

Harrison County Medical Society, at its meeting in Clarksburg on December 6, chose Dr. Frank V. Langfitt, Clarksburg, as President; Dr. E. A. Hill, Clarksburg, Vice-President; Dr. B. S. Brake, Clarksburg, re-elected Secretary; and Dr. E. A. Teets, Clarksburg, re-elected Treasurer.

The Central West Virginia Eye, Ear, Nose and Throat Academy convened in Clarksburg for its annual meeting. Dr. C. C. Jarvis, Clarksburg, was elected President and Dr. I. D. Cole, Clarksburg, Secretary-Treasurer.

Dr. A. T. Post, Clarksburg, was elected President of the Kiwanis Club of that City at the annual election in December.

Huntington opened its new City Hospital on November 15 with a public reception. Dr. Lindsey T. Vinson, Huntington City Health Officer, is administrative head of the new hospital and will have charge of x-ray work. Dr. R. J. Wilkinson, of the C. and O. Hospital, is Chief of Staff.

Dr. Gilbert S. Caudy, Tioga, was married on October 6 to Miss Helen Jane McCarthy, of Nelsonville, Ohio.

Dr. Harold Walling Smith, Huntington, and Miss Olga Egri, also of Huntington, were married September 26.

Dr. William Edwin Dickerson, Princeton, and Miss Norma Arline Bird, Rock, were married September 22.

Deaths

Dr. George M. Mayers, Fairmont, aged 51, dropped dead December 2 in Washington, D. C., as he was walking through a theater.

Dr. B. Moffett Chenoweth, Wendel, aged 57, died December 2.

Dr. William Clyde Etzler, Wheeling, aged 58, died November 5 of heart disease.

Dr. James J. Duffy, Moundsville, aged 71, died November 19 of cerebral hemorrhage.

Dr. Charles B. Blubaugh, Parkersburg, aged 60, died October 5 of cervical cellulitis and spinal metastasis from a renal tumor.

THE INJECTION TREATMENT OF VARICOSE VEINS

The injection method of treating varicose veins is attracting great interest. The French School under the leadership of SICARD used 20%, 30% and 40% solution of sodium salicylate which according to reports in the literature appears to be the salt of choice.

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12 ampoules, 4 of each concentration in a box at $2.00 per box.

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